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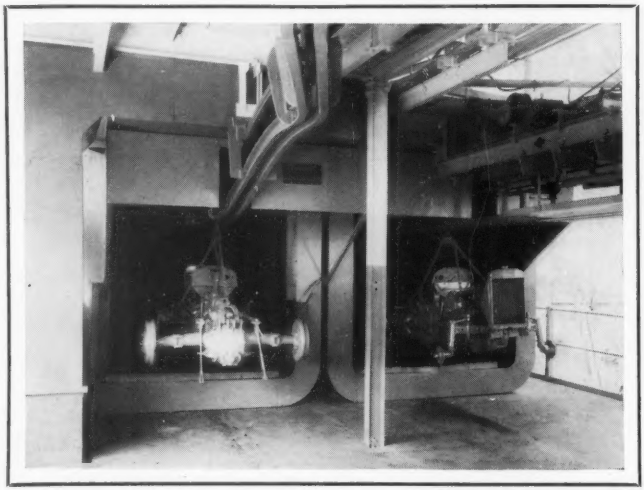

By courtesy of the Standard Motor Company

Continuous Finishing plant for Ferguson Tractors.
Entry and exit end of the final coat oven.

Carrier Engineering Company Ltd

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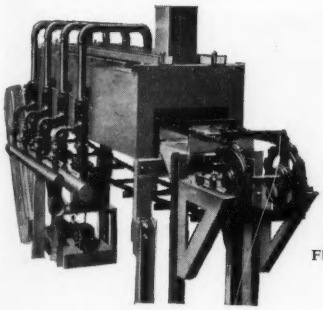

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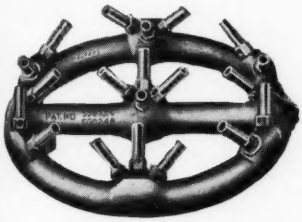

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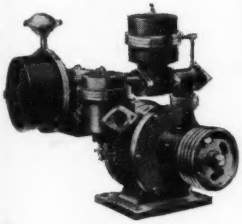

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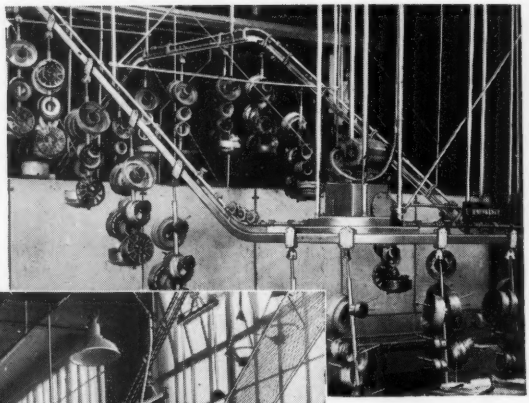
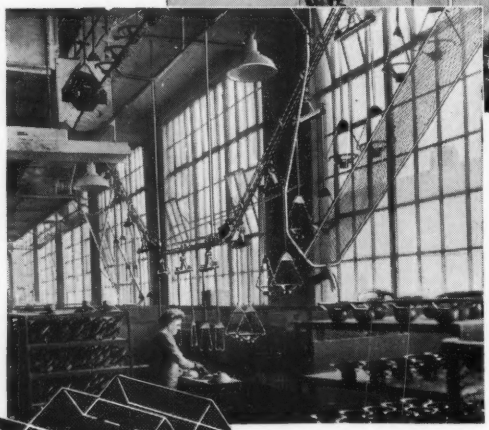
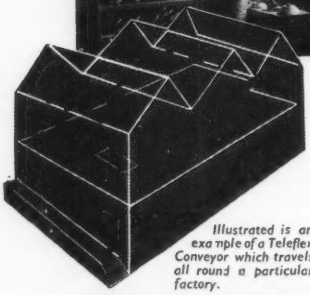


Right:-
Teleflex conveyors form an important aspect of the production system of Messrs. A. C. Delco—Division of General Motors.



Left:-
Teleflex conveyors are important links in the production lines at the works of the Plessey Co. Ltd., Ilford.



Illustrated is an example of a Teleflex Conveyor which travels all round a particular factory.

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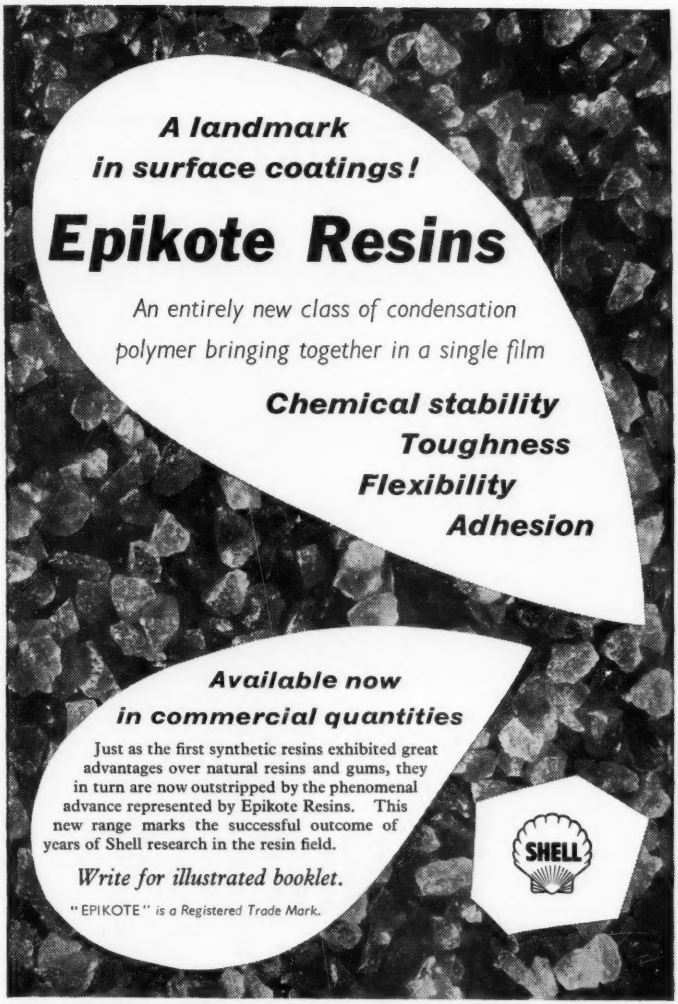
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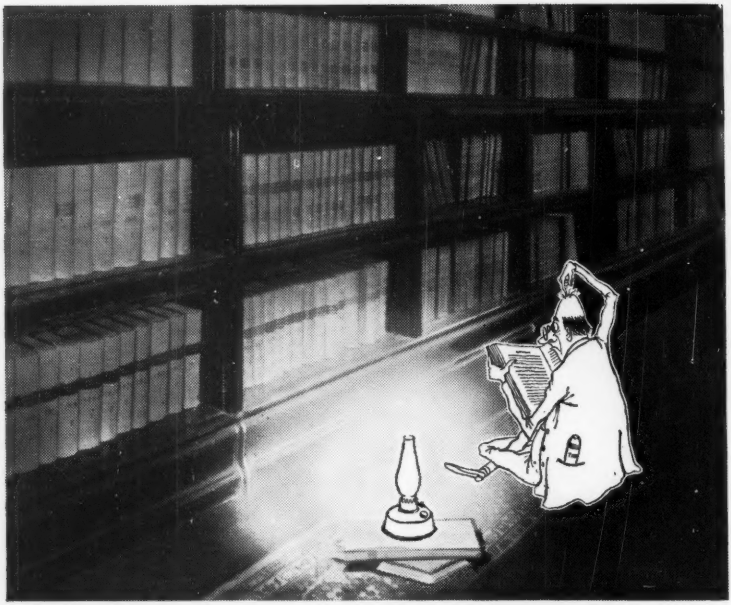

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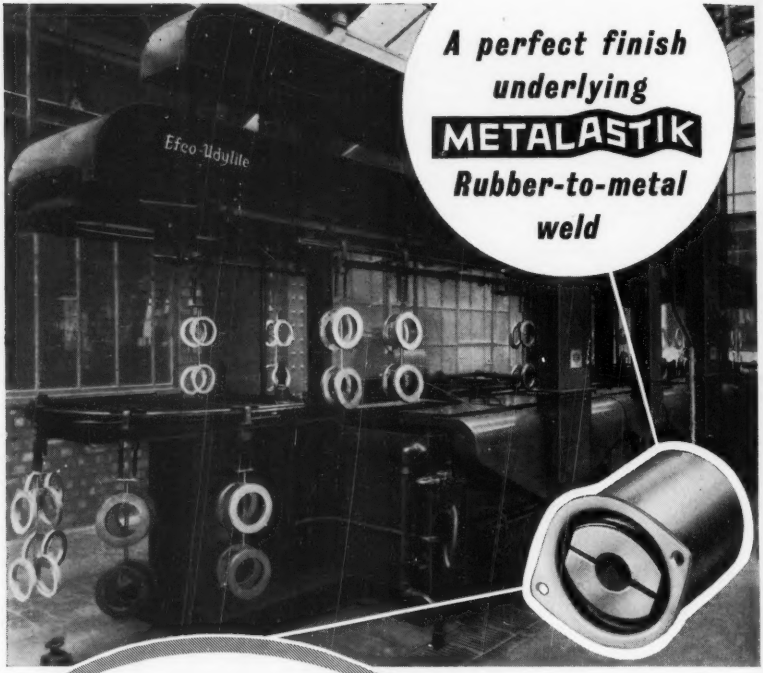

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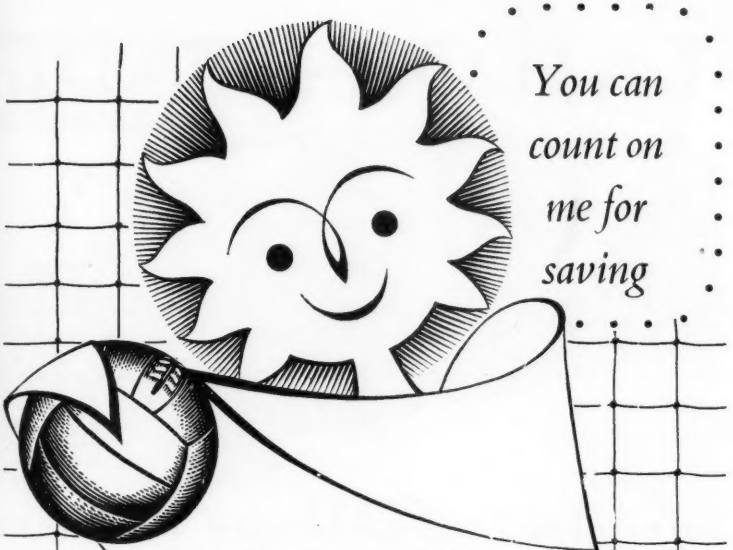

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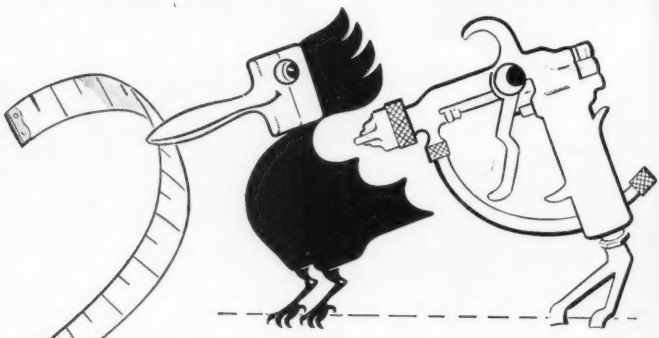

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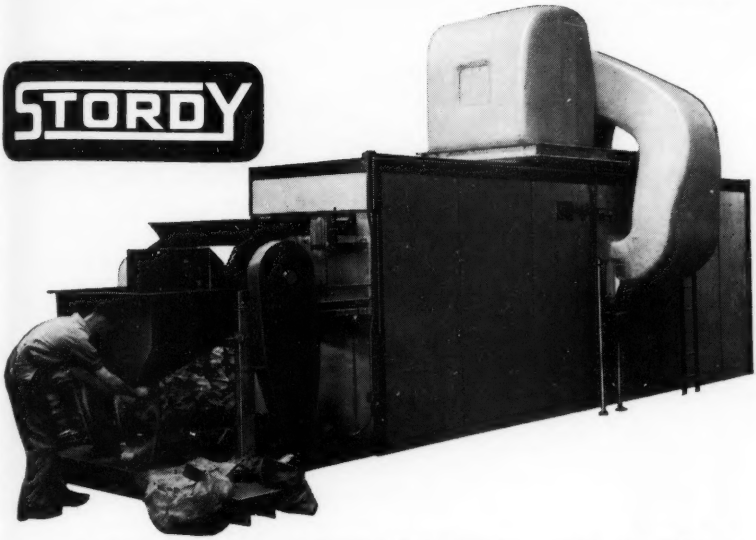

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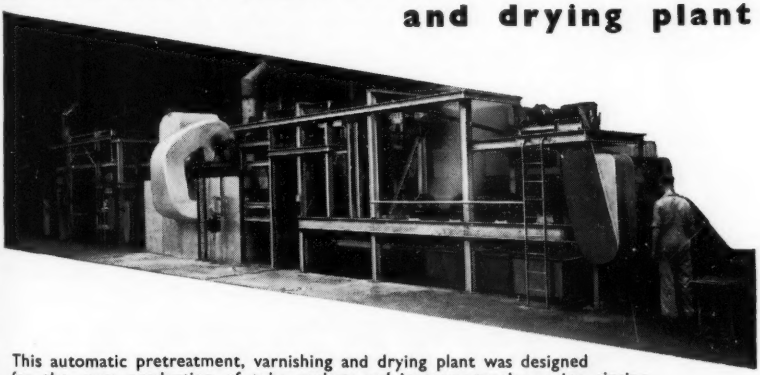

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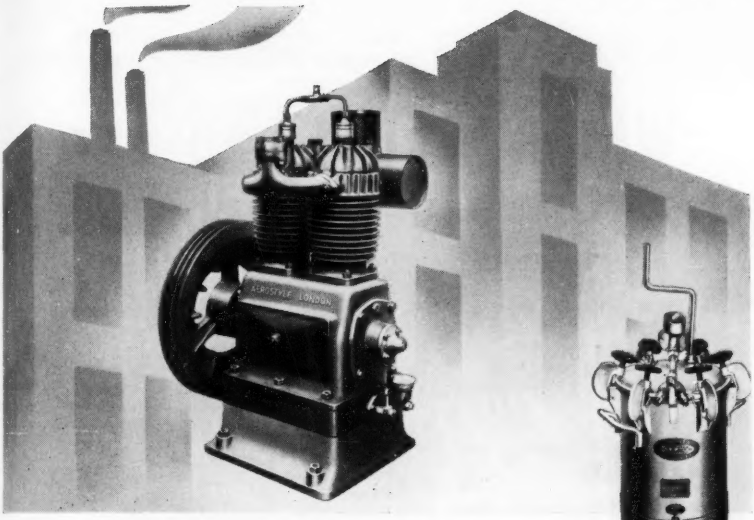

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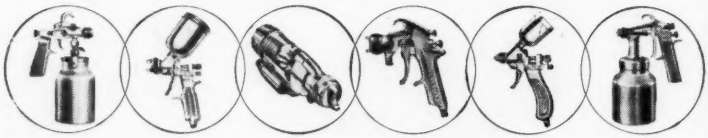

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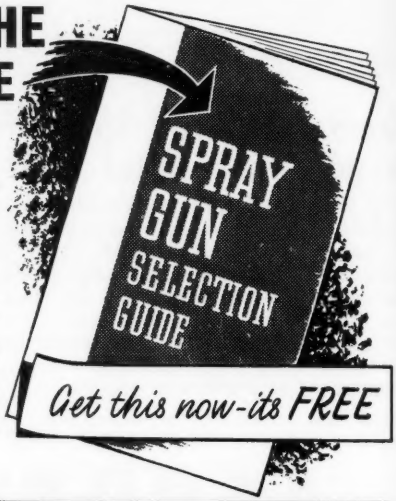

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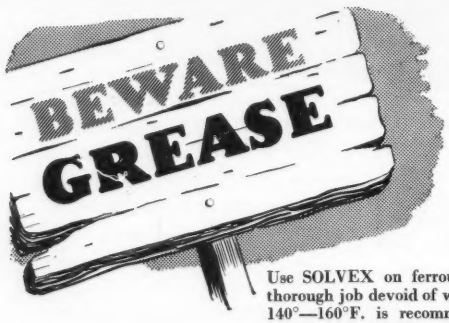

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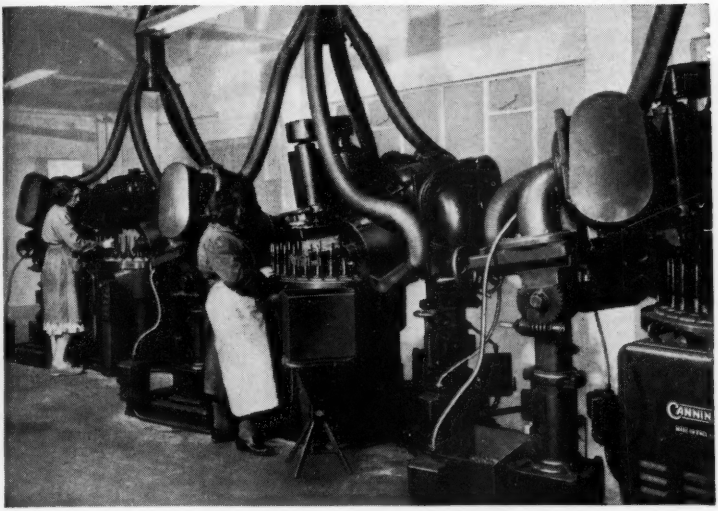

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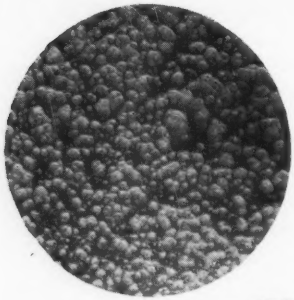

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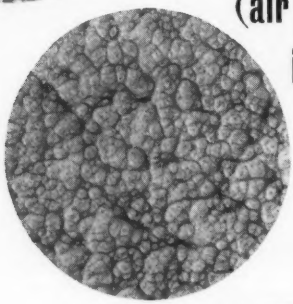

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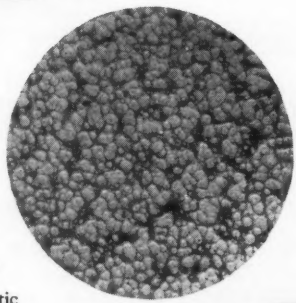

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VOL. 5 JULY, 1953 NO. 61

READER SERVICE

THE publishers and editorial staff of this journal hold very firm views about the sort of service a reader is entitled to expect from it. A technical journal such as this is the natural source to which people in the industry turn for information and guidance. We are always ready and willing to give assistance and information, we are always glad to help you locate a little known product or service and are always happy to publish letters from readers on subjects of interest to the trade.

How many times, reading through your copy of "INDUSTRIAL FINISHING," have you come across an item worth following up? A brochure about a new method, a catalogue of equipment in which you are interested, a data sheet on some new method of processing or, perhaps, just a simple reprint from a technical paper. Whatever it is, the sequence of events is usually the same. You make a mental note to write for it, perhaps you go further, and jot down the names of about five or six items in the issue, but how often does the job get carried to its conclusion? how often do you forget, or put it off because you are busy? How many interesting and possibly profitable things do you miss?

When an item appears in "INDUSTRIAL FINISHING" the name and address of the firm concerned is always given if it is known to us. The reader pays for his journal and is entitled to this information. We are, however, carrying this service a step further.

Elsewhere in this issue will be found a special "Reader Service Card" by the use of which selected items can be obtained direct without having to write to several different manufacturers. We hope that the use of this system will save the time of readers and constitute a convenient and quick method of obtaining information.

True to our standards as outlined above we are still publishing the names and addresses of all the manufacturers concerned, readers may, if they wish, get in touch with them direct but the idea of the service card is to save time and trouble. In addition to the special section described, we are, of course, always ready to help with your special queries as before. The experience of our editorial staff is at your service and it is up to you to make use of it.

BUTYL TITANATE

by

R. SIDLOW A.R.I.C.

Peter Spence and Sons Ltd.

FOR the past twenty years or so organo-silicon compounds have attracted considerable attention on account of their outstanding properties. The possibility that titanium might form a similar range of compounds has attracted the attention of a number of investigators.[1,2] No titanium compounds corresponding to either silanes or silicones have as yet however been obtained, although esters derived from the hypothetical orthotitanic acid have been known for some time. Kraitzer, McTaggart and Winter investigated the preparation and properties of a number of alkyl titanates, concluding that the butyl ester had the most favourable combination of properties.[2]

Preparation of butyl titanate

By analogy with silicon it might be expected that titanium esters would be formed by interaction of titanium tetrachloride with the appropriate alcohol. This is not however the case; in order to form the titanium esters the presence of ammonia,[3] an amine[4] or sodium[5] is necessary to combine with the liberated hydrogen chloride. Butyl titanate is prepared by adding titanium tetrachloride to excess normal butanol and then bubbling anhydrous ammonia gas through the mixture. The precipitated ammonium chloride is filtered off and the excess butanol evaporated under vacuum.

Properties

The ester, as prepared on a commercial scale, contains about 3 per cent. free butanol, left after evaporation. Despite this free alcohol the product contains more than the theoretical quantity of titania—24 per cent. to 25 per cent. compared with 23·5 per cent. This is due to some thermal decomposition and condensation having occurred during the preparation. In the majority of instances this is no detriment; it is, in fact, of advantage in many cases as the titania is the desired component.

Butyl titanate cannot be distilled unchanged at atmospheric pressure, although this operation can be carried out under reduced pressure. As normally prepared the ester is an amber coloured, rather viscous liquid, with a characteristic odour. It is miscible in all proportions with practically every anhydrous solvent.

The physical properties of the commercial material are:
Boiling point: about 300° C. at 760 mm.; 160° C. at 3 mm. Density: 10·0 lb. gall.$^{-1}$ Surface tension: 29-30 dynes cm.$^{-1}$ at 20° C. Specific heat: 0·40. Refractive index: $1{\cdot}57D_{20}$

Flash point—depends on butanol content; pure butyl titanate 170°F., with 5 per cent butanol it falls to 96° F.

Chemical Properties

Chemically, butyl titanate behaves as a typical metal alkoxide; it is readily hydrolysed by water, either as liquid or vapour, to give hydrated titanium dioxide and liberating butanol. Aqueous solutions of strong acids will dissolve the titanium dioxide and no precipitate will be produced if sufficient acid is present. Wet solvents also cause hydrolysis, but if the amount of water present is small, precipitation does not always occur. Thus a butanol solution of butyl titanate will tolerate the addition of considerable quantities of water without obvious immediate effect. An ethyl cellosolve solution on the other hand thickens considerably on the addition of small quantities of water and rapidly forms a gel.

These reactions have been used to prepare modified forms of the ester which are claimed to possess certain advantages.[6] By partially hydrolysing the butyl titanate a "condensed" form

of the ester is produced. This can be done by heating the ester either with moist butanol or with acetic acid, or by bubbling moist air through the heated ester. By these means, it is possible to produce materials containing up to 50 per cent. titanium dioxide and which are still soluble in organic solvents.

Use of butyl titanate in heat resistant paints

Prior to the work of Kraitzer, McTaggart and Winter, titanium esters had been of only academic interest; these workers, however, suggested several industrial uses for these compounds, the most promising being as a constituent of heat resisting paints.

Butyl titanate is not by itself a film forming agent—a film of the ester exposed to air hydrolyses, forming first a continuous solid film, which then rapidly crumbles to a powder. Aluminium pigment applied to a metal surface as a suspension in a volatile solvent remains as a coating on the surface after drying. This coating is, however, only loosely adherent and easily removed by rubbing. By incorporating aluminium pigment with butyl titanate, coherent and adherent films can be obtained. Non-leafing pigments will not yield a coherent coating with butyl titanate—such films become powdery on drying.

These butyl titanate/aluminium paints dry very rapidly by virtue of the hydrolysis of the titanium ester; paint films are touch dry in about 10 to 15 minutes. Hydrolysis of the ester is not however complete after this period, but after about 2 hours the ester, for practical purposes, can be considered as having reached a stable form. It is preferable therefore to avoid heating the paint film for about 2 hours after application; this period also allows evaporation of solvent, etc.

When butyl titanate/aluminium paint films are heated, the small amount of residual organic matter is removed and the remainder consists of titanium dioxide and aluminium metal. The aluminium acts as the primary protective agent with the titania serving to give an adherent film. In effect the film produced is rather similar to an aluminised or similar sprayed aluminium coating; in this respect the suggested application of ethyl silicate solution to improve sprayed aluminium coatings is of interest.[7]

Paints based on organic resins are not serviceable at temperatures above about 200° C. to 250° C. Silicone resins can be used in paints at temperatures up to about 450° C. However, the entirely inorganic nature of butyl titanate/aluminium paint films after heating enables them to withstand temperatures of up to about 600° C. Claims have been made that such films will withstand higher temperatures, but performance is unreliable and at best they can offer protection for only only a limited period.

Application

As a consequence of their rapid drying butyl titanate paints have poor levelling properties and do not brush out well. This is evident when such paint films have been heated for a while: corrosion first becomes apparent in the brushmarks where the film is thinnest. The use of two or three coats of paint helps to overcome this difficulty, but too thick a film should be avoided as the adhesion tends to become poorer with these thicker coatings. The average coverage of butyl titanate paints when brushed is about 100 yards^2 gallon^{-1} for each coat. In general, a better performance is given by these paints when sprayed, since a thicker and more even coating can be obtained by this technique. The gum should be held closer to the work than normal practice, again because of the rapid drying of the paint. By spraying, a sufficiently thick film can be obtained with a single coating; a coverage of about 40 yards^2 gallon^{-1} is satisfactory. The rapidity and mechanism of the drying of butyl titanate paint films enables these thick coatings to be produced and which have better adhesion than two thinner coats—the reverse of conditions for most other paints.

Paint Composition

Butyl titanate paints can be made by incorporating the requisite proportion of aluminium paste with the ester and adding thinner. Such paints contain all the necessary ingredients for high temperature resistance although resinous materials may also be inclu-

ded in the formulation. These latter serve to improve the brushability and also to increase the weather resistance of such paints when used at temperatures of 250° C. to 300° C. Conversely the addition of butyl titanate to an aluminium paint used at temperatures of 200° C. and upwards will improve its performance at these higher temperatures.

A major factor in the weather resistance of a butyl titanate/aluminium paint film is the relative quantities of ester and aluminium pigment present in the original paint.[8] Excessive quantities of butyl titanate render the paint film more porous and permit increased corrosion. On the other hand a deficiency of the ester gives a film only loosely adherent, again causing increased corrosion. For optimum results the paint should contain equal quantities of butyl titanate and aluminium pigment. In the case of aluminium paste (60 per cent. aluminium) the quantities used should be in the proportion three parts paste: two parts butyl titanate. High temperature exposure tests of various formulations indicate that paints with different (but not widely different) ester/aluminium ratios do not have appreciably different performances. It is therefore recommended that butyl titanate paints should be compounded with equal quantities of ester and aluminium pigment.

Cleaning of the metal surface prior to painting

This factor is extremely important since a poorly adherent coating will tend to become detached on heating through the differential expansion forces. For best results the metal should be abraded to give an absolutely clean surface, e.g., by grit blasting or in some cases by wirebrushing. Millscale is particularly detrimental since the paint does not have very great adhesion to it and it tends to flake off on heating. Flame cleaning is a useful procedure since loosely adherent material which would become detached in subsequent service is removed before painting; it should, of course, be followed by vigorous wirebrushing.

Trials with butyl titanate paints

A number of trials have been carried out by prolonged exposure of painted mild steel specimen panels to high temperatures.[8]

One such trial was carried out by hanging painted panels in an electric heat-treatment muffle. The panels were abraded with emery and then wiped with carbon tetrachloride before painting. A number of proprietary "heat resistant" paints, as well as butyl titanate paints, applied by both brushing and spraying, were included in the trial. The panels were inspected after 200 hours and 500 hours heating at temperatures between 400° C. and 580° C., the results and conclusions being similar on both occasions. The furnace was used daily for a batch process so that the actual time of exposure at elevated temperatures was greater than that quoted by the heating and cooling periods. Furthermore this intermittent heating and cooling produces periodic stresses between the paint film and its support due to differential expansion. Panels coated with butyl titanate/aluminium paints showed very little sign of corrosion especially when the paint had been sprayed; the paints when brushed showed some corrosion in the brushmarks but the extent of this was slight. Of the other paints tested only those containing silicone resins had offered any degree of protection under these conditions. Two such silicone paints were included; one of these gave a performance equal to the butyl titanate paints, but the other was definitely poorer.

A second series of panels was exposed in a gas fired muffle operating at 550° C., again on a batchwise process with intermediate cooling down and heating up periods. An examination of the panels after 1,000 hours exposure—about four months—again showed that the butyl titanate/aluminium paints had offered almost complete protection. Varied results were again obtained with the two different silicone paints; it cannot, however, be concluded from these results that silicone paints are necessarily inferior, but it is indicated that they are not outstandingly superior. A number of panels cut from badly corroded steel plate were included in this series in order to test the effect of various cleaning procedures. In general these panels were all somewhat inferior to the remainder of the panels

but flame-cleaning did give a surface satisfactory for subsequent painting.

These results have been confirmed by trials on actual equipment including hot parts of muffle furnaces, a rotary furnace kiln, a contact sulphuric acid plant, electric hotplates and fires.

Tests have been carried out by the New South Wales Railways Testing Laboratories on the use of butyl titanate paint for engine fire-hole doors.[9] They examined two doors after painting and service; having first carefully recorded the thickness of the metal at various points. Three coats of paint were brushed onto each door which was then put into service for twelve months. Door B, of which only half was painted, showed much greater wastage, including a large hole on the unpainted portion, and gave a definite ridge at the edge of the painted area.

If practicable, the paint should be applied as soon after mixing as possible since the leafing properties of butyl titanate/aluminium paints deteriorate more rapidly than other aluminium paints. Ready mixed paints can be used and will give satisfactory service; mixing immediately prior to use gives improved performance and appearance.

Further Developments

Work has been carried out by the Australian C.S.I.R.O. on the use of various modified forms of butyl titanate.[6] These modified esters can be pigmented with zinc dust and such paints when used as priming coat for a butyl titanate/aluminium paint are said to give increased weather resistance. Against this must be set the disadvantage of the lower melting point of the zinc which limits the useful temperature range of the paint.

Butyl titanate acts as a catalyst in reducing the curing time and temperature of silicone resins.[10] Resins which normally require heating at 200° C. to 250° C., can be cured at temperatures as low as 50° C. to 80° C. after the addition of butyl titanate. Titanium esters will also react with hydroxyl groups in organo-silanols to yield compounds with Si-O-Ti linkages and which are claimed to possess improved properties.[11]

An analogous property of butyl titanate is its acceleration of the "drying" of linseed and other drying oils. The presence of a conventional metal drier appears to be necessary for this to occur as the ester has no effect on raw linseed or tung oils.

Outside the paint field, titanium esters have been suggested as waterproofing agents for textiles, wood paper and leather.[12] Of these applications the last appears the most promising, especially in view of work carried out by the British Leather Manufacturers Research Association.[13] Thus chrome-tanned leather is normally regarded as fairly non-wettable, being much superior to vegetable-tanned leather. By treating the latter with a 10 per cent. solution of butyl titanate in white spirit a product is obtained which, under the test conditions, is as good as chrome-tanned leather.

This survey has shown titanium esters to have a number of potential industrial applications, and the history of these compounds demonstrates the transition from purely academic research to industrial usage.

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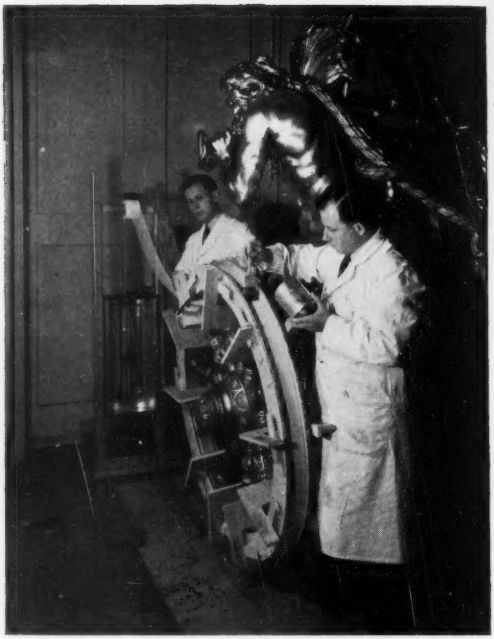
13. Private communication.

The State Coach of England



Synthetic resin being applied to a front wheel by brush and then covered with cotton bandage. Infra-red heating unit in the background speeds up the drying process

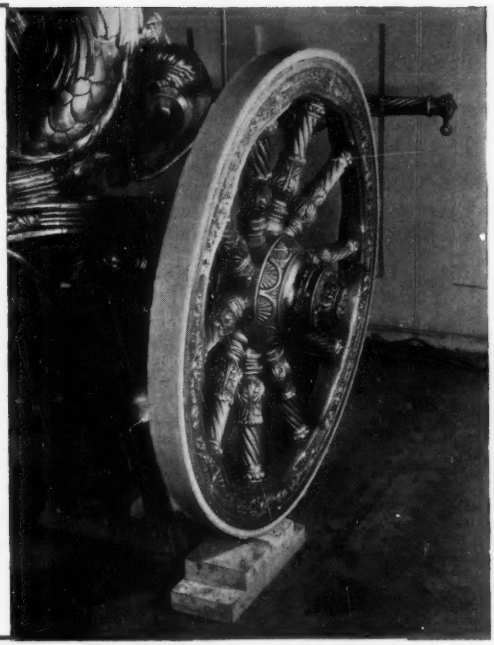
NOW that the Coronation is over it is interesting to reveal details of just another of those small but important preparations which literally added to the smoothness of the proceedings.

For many years the maintenance and renovation of the magnificent coach, built in 1761 for George III, has been in the hands of the old-established coachbuilding firm of Hooper & Co. (Coachbuilders) Ltd. The task facing Hoopers before this Coronation was the restoring of the roundness of the wheels and the fitting of rubber tyres capable of carrying the four-ton coach for at least 6½ miles at three miles per hour.

The wheels could not be mounted in a lathe and the high spots removed from the tyres by turning them down, for the wheels were nearly one inch out of round in places and the amount that would have to be removed was in some cases nearly twice the thickness of the iron tyre.

Nor could the iron tyre be removed and the wheels rebuilt owing to possible damage to the carving on the wheels, and to the fear that once apart it would be found impossible to rebuild them. It was suggested that a layer of synthetic resin should be built up evenly round the iron tyres. After hardening, the resin could then be cut down until the wheel rim was perfectly round once more, leaving a minimum thickness of synthetic resin of about ⅜ in.

Hoopers then suggested that a rubber tyre about one inch thick should be bonded to a false tyre of 14 gauge steel by means of synthetic resin adhesive, and that this false tyre should be attached to the existing iron tyre by means of side lugs which would be drilled to marry up with tapped holes in the side of the iron tyre. The



By means of a 6 in. cutter fixed to the floor, the built-up rim of synthetic resin is cut down until the wheel is perfectly round once more. The wheel is lowered on to the cutter by the screw jacks supporting the axles

(Photographs reproduced with acknowledgements to A. C. Cooper Ltd., London. Copyright reserved to H.M. The Queen.

thickness of the new tyres had to be kept down to a minimum, for the top of the coach already cleared by three inches only certain arches under which it had to pass.

Aero Research applied their Araldite Type D synthetic resin by brush, with a bandage of cotton material wound round the tyres over each coat to prevent the liquid resin from running away from the tyre during the hardening process.

When a sufficient thickness of resin had been built up, heat was applied to the resin by two infra-red element projector units provided by the Metropolitan-Vickers Electrical Co. Ltd. The application of artificial heat not only speeded up the hardening but produced a harder compound than if the resin had been allowed to harden naturally. The resin was heated to about 50°—60° C. and the wheel slowly turned during the hardening process.

A six-inch cutter blade was then used to turn down the cotton-filled resin until the wheels were truly circular once more.

The next stage was the manufacture of 14 s.w.g. mild steel segments and securing lugs to which was bonded the solid Dunlop rubber trip for the tyres. The segments were finally attached to the existing iron tyres by means of cheese-headed set screws.

WORKS VISITS

WILD-BARFIELD ELECTRIC FURNACES LTD., announce that they are again extending an invitation to senior students of technical colleges, training schools and like institutions, to visit their works during winter session from October to May.

The tours include an inspection of the research and development departments as well as the production side, and take place during the afternoon of any day during normal working weeks (Monday to Friday).

As these tours have become a popular feature with senior technical students, readers would be well advised to apply for a date giving an alternative, if possible. Applications should be addressed to: Electfurn Works, Watford By-pass, Watford, Herts.

LATEX, NATURAL AND SYNTHETIC

by

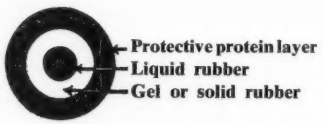
B. M. LETSKY, M.Sc., F.R.I.C.*

IT is often said that man cannot improve on nature. In these days of plastic surgery and jet travel, such generalisations are untenable. Man can, does, and will, constantly modify nature, sometimes for the worse, but more often for the better. It is in this peaceful, harnessed ingenuity of the scientist and the craftsman, this continual interaction between inner urge and outer circumstance, that the essential divinity of man lies.

It is, of course, true that a host of natural products, inexorably selected and built up into complex molecules over hundreds of thousands of years (in a way that make our short term postulates on heredity look absurd), possess intrinsic advantages which are very difficult to match by synthetic means. Such a product is shellac, which still defies synthetic substitutes. Nearer to the subject of these brief notes is the sap of the tree "rhus vernicifera." This lactiferous secretion (Chinese or Japanese lacquer) is probably the first "latex" to be used for protective and decorative purposes by man. The durability of this product, extending into hundreds of years, should be a timely leaven to our pride in modern achievement in synthetic coatings.

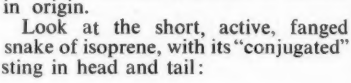
The use of natural rubber latex is much more modern and widespread; use really commences with the first vulcanisation patents taken out some 120 years ago. Since this time there have been major developments in the production of natural and synthetic latex, stimulated largely by the urgent needs of transport and protective coating industries. It is of interest to note, in this connection, that the structure of synthetic rubber-like latex and the natural product are closely related both in their physical properties and their chemical reaction to vulcanisation agents, coagulating agents, protective colloids and proteins, antioxidants and preservatives.

The general structure of natural latex particles can be roughly represented as follows:



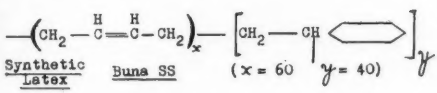
In fact, the whole of the washable water paint industry can be classified as emulsions of water,—insoluble products in aqueous medium, which coalesce into continuous protective coatings on drying out the aqueous phase. One obvious and intriguing feature is the fact that the whole of the modern organic protective coating industry is based on the electrochemical properties of the conjugated double bond, and this applies to most materials, whether synthetic or natural in origin.

Look at the short, active, fanged snake of isoprene, with its "conjugated" sting in head and tail:



* *Director of Industrial Finish Development, Ault and Wiborg group of companies.*

This natural chemical unit, polymerised, isomerised or condensed during the metabolism of the shrub, tree or plant, is probably responsible for all natural latex and most of the natural resins. Man has streamlined *his* active unit by the use of butadiene from petroleum sources. In America, butadiene, co-polymerised with styrene or acrylo nitrile, is the basis of the synthetic rubber industry and the modern latex washable water paint. Buna S and Perbunan rubbers are of this type. In Great Britain, concentration has been on polyvinyl chloride, polyvinyl acetate and polyvinyl butyral types, in the main. The possible structure of a Buna rubber can be represented as follows:



The general method of manufacture possibly bears some relation to the formation of latex in the living plant. The mixture of monomers, in the requisite proportion is emulsified with the appropriate emulsifying agent and water. The action of the plant enzyme is imitated by the use of catalysts of the peroxide type, viz. ammonium persulphate, benzoyl peroxide, ammonium perborate, etc. The polymerisation is completed by refluxing at temperatures from 40° to 60° C. for times up to 20 hours.

Latex, emulsions and colloid dispersions play a vital part in the complex and speedy transformations of nature during the metabolism of life itself. It is now generally appreciated that the labile molecules of living nucleo protein require as an essential, the enormously increased reactive surfaces which emulsions and colloid dispersions only can provide. It is this general appreciation which has provided the background for the increasing amount of work on emulsions in organic protective coatings.

Formulations for latex paints on both sides of the Atlantic have basic similarities, and the main phases of a commercial water paint of this type could be stated as follows:

1. Latex aqueous polymer (oil, synthetic resin, rubber, etc.)
2. Protective protein for thickening and stabilising emulsion.
3. Aqueous pigment dispersion.
4. Water.

Additional wetting agents are used to facilitate dispersion of the pigment. Extra thickeners of the methyl cellulose or alginate type are used to improve physical properties and give desirable thixotropy. Modern types of preservative for the protein are invariably included. This published formulation of a latex paint from an American source is a good example of a modern formulation:

Titanium dioxide	21·00
Lithopone ...	6·00
Soya bean protein	1·90
Latex (Butadiene-styrene)	18·00
Sodium pentachlorophenate	0·07
Tetra sodium pyrophosphate ...	0·15
Ammonia (26 Be.)	0·19
Wetting agent ...	0·07
Ammonium alginate	0·10
Total water ...	49·52
	100·00

The tetra sodium phosphate and wetting agent are used to facilitate grinding and prevent flocculation of the pigment. Sodium pentachlorophenate is one of the standard preservatives for the protein thickeners and stabilisers. Ammonia is the most convenient alkali for solubilising the protein, stabilising the emulsion and conveniently disappearing, to increase the water resistance of the dried film.

The use of all types of latex, natural or synthetic is well established for wire coatings, dipped goods, sheet and moulded products of all kinds. For the paint industry, one might well ask: Why add another complicated product to the many thousands of formulations being used successfully today? One could answer, in general terms: we can neither stop the clock nor turn it backwards. More specifically, the general properties of emulsions have, rightly, intrigued the alert chemist and paint manufacturer. No other type of dispersion will give such high solid and pigment concentration, and yet retain the freedom of shear and "brushability"

which is characteristic of the emulsion. Added to this, the latex emulsion, properly formulated, gives a washability, unapproached by the older, oil varnish, gelatine type. For matt and semi-gloss paints, the latex type, because of its unique resistance to acids, alkalies, detergents and water, have come to stay.

When the gloss and general levelling properties are improved, as they undoubtedly will be, then we can be certain of a still greater future for latex coatings in the paint industry.

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Conservation of Raw Materials

SOURCES OF INFORMATION

RESEARCH organisations in Great Britain and the principal European countries are working on the problems of conserving such raw materials as metals, fuels, chemicals and textiles which are scarce. The work being done includes the discovery of methods of economising in the use of the materials, the provision of adequate substitutes, the recovery of waste materials and the protection of materials liable to be attacked by corrosion or decay.

It is not always easy for an enquirer on these subjects to discover all the sources of information on the problem in which he is interested. A list of sources on a wide range of subjects has now been collected by the sub-committee for co-operation in scientific research and technical development of the O.E.E.C. The information available covers work being done in Austria, France, Germany, Italy, the United Kingdom and Sweden.

The list consists of standard sheets, each devoted to a particular subject of research and giving the names and addresses of persons or organisations from which detailed information on that subject can be obtained. The sheets can be consulted at, or borrowed from the Technical Information and Documents Unit, D.S.I.R. at Cunard House, 15 Regent Street, London, S.W.1.

The principal materials and techniques of interest to finishers and on which work is being done are:

Building materials.
- Economy in the use of materials.
- Protection from fungus and rust.
- Wood construction techniques.

Cellulose.
- Improvements in cellulose chemistry.
- Manufacture of cellulose from wood waste.

Corrosion.
- Prevention of corrosion of steel.
- Studies of corrosion problems to save metals.

Glass.
- The use of glass fibre as a furnishing material.

Iron and Steel.
- Saving of steel by economical design of structures.
- The recovery of pickling acids.
- Substitutes for galvanizing.

Non-ferrous metals.
- Conservation of copper, zinc, tin, lead, tungsten, etc.
- Protective coatings for metals.
- The substitution of aluminium for copper.

Plastics.
- Use of plastics for plumbing.

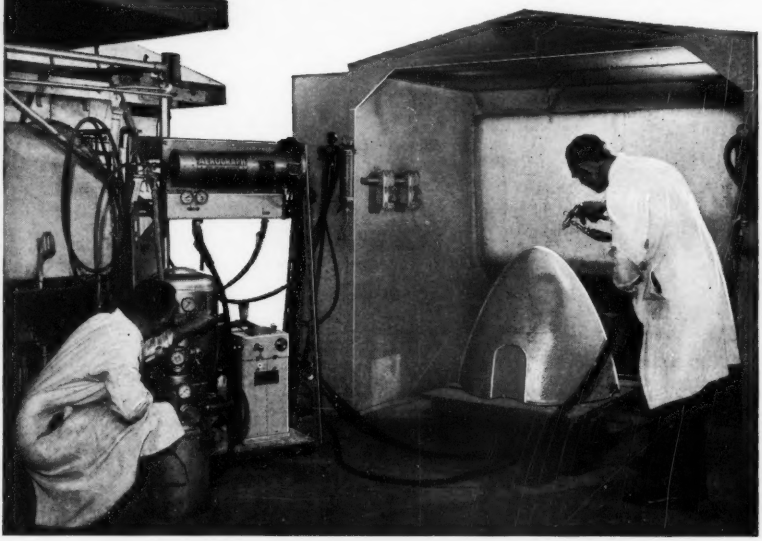
Rubber.
- Substitutes for electrical rubbers.
- Conservation of rubber.
- Home-produced carbon black.

Sulphur.
- Sulphuric acid production.
- Conservation of sulphuric acid.

Wood.
- Conservation of wood.
- Uses for wood waste.
- Wood as a substitute for metals.
- The use of new woods in the chemical and printing industries.

Cooper and Co. (Birmingham) Ltd., felt manufacturers, ask us to point out that following the transfer of their administrative departments to South Wales, all payments and advices of payments should be made to the following address: Cooper and Co. (Birmingham) Ltd., Brynmawr, Breconshire, and not to the Birmingham address. Traders' credits should still be made out to Midland Bank, New Street, Birmingham.

HOT SPRAY PAINTING



How to Control the Finish—from the Start

The great advantages of Hot Spray painting are only just being realised. For many industrial purposes the use of the pre-heating process will give an excellent finish much more quickly, with less labour and with an appreciable saving in cost.

For those who want to know more about it, the Demonstration Centre offers full facilities for practical demonstrations on customers' own products. What is more, we will gladly train paint-shop operatives at specially arranged short intensive courses—at no cost or obligation to the customer.

This is *your* opportunity to gain impartial and unbiased advice on the process that is revolutionising many industrial finishing procedures. If the process is suitable for *your* product, we will show you how best to use it. If it is *not* suitable we will save you expensive "trial and error".

The photograph shows a corner of the Demonstration Centre with operators hot-spraying synthetic enamels at the water-washed spray-booth. Three types of paint heaters are shown in the illustration. Take advantage of this "know-how" and let us help you to *control* your finish.

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Processing and Finishing in the Ammunition Industry

A REPORT recently published* gives some very interesting facts about the methods and equipment used in American ammunition factories.

A typical example is the method of descaling billets from which 105 mm. and 120 mm. shell bodies are made. In this method heated billets are withdrawn from the furnace at the plant of General American Transport Corporation by hand-operated telfer-supported manipulators and placed on a slipway which conveys them to the descaling chamber.

This chamber consists of a box in which a number of spray jets, operating at 1,500 p.s.i., spray fine jets of water on to all surfaces of the billet as it is conveyed through the chamber. The scale removal was completely effective.

After various piercing and drawing operations the billets, having now become shaped forgings, are conveyed to vertical shot-blasting machines, each of which is capable of an output of 300 shells an hour. Any defects in the cavity are either ground out, or removed by using a spade cutter held in a heavy-duty vertical drilling machine, the shell forging being held in a vee clamp.

For final finishing the shells are zinc phosphated and passed to the painting section. For painting they are stood base down on a conveyor and passed in front of a spray booth, where they are mechanically rotated. At this point the shells are sprayed outside with air-drying olive-green paint and inside with acid-resisting black bitumastic air-drying paint, the fuse hole threads being protected by a sleeve which is dropped in before loading on the conveyor.

In the Chevrolet Shell Division of General Motors a simple machine (illustrated Fig. 1), is used to mark shell bodies. In this machine shell bodies roll down a chute, are checked and fed singly by a paddle wheel whilst a stamping block is brought down on them by air pressure.

Another interesting plant visited was the Ecko Corporation where lines were in process of installation for producing steel artillery cartridge cases, (a) 76 mm. for Army use and (b) 3 in., 50 cal. for Navy use.

The whole of the interstage annealing for these lines was concentrated in one furnace for each plant line. The annealing furnaces were of the roller hearth type with controlled atmosphere obtained from a mixture of fuel oil and Town gas. Each furnace was over 100 ft. long. After annealing, all the components on one plant line were then conveyed to a spray pickling and bonderizing plant, there being one such equipment per plant line; it was approximately 70 ft. long × 8 ft. wide × 6 ft. 6 in. high. The baskets used to convey the work through the furnace and the spray pickling and bonderizing plants were made of Inconnel.

A zinc-plating plant was installed for each plant line. General details

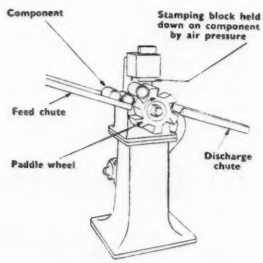

Fig. 1. Machine for marking shell bodies

* *"Productivity Team Report on Ammunition," published by British Productivity Council on behalf of the Anglo-American Council on Productivity. Obtainable (price 5s.) from British Productivity Council, 21 Tothill Street, London, S.W.1.*

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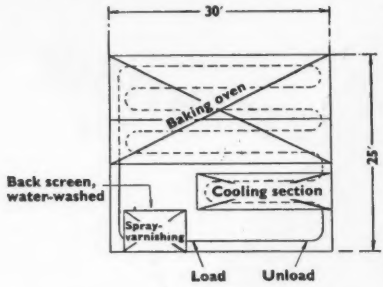


Fig. 2. Layout of shell case varnishing, baking, cooling plant at Frankford Arsenal

of this plant, obtained from the makers —Lasalco Inc., St. Louis, Mo.—were:

The capacity range was from 250 to 600 cases per hour.

The cost of the plant was $103,000, which included the conveyor, tanks, temperature controller, filter, exhaust fans, D.C. power and starting chemicals.

A total input of 19,000 amps. at 6 volts was required. The power plant efficiency was from 75 per cent. to 80 per cent. For reverse current electric cleaning it was necessary to apply 75 amps. per sq. ft. at 6 volts. The pickling solution was 10 per cent. to 15 per cent. sulphuric acid with inhibitor, and the mouth annealing scale was removed within one minute. Reverse current was used on the cyanide dip to remove smut which occurred on the case.

Zinc plating was a ten-minute process; 60 amps. per sq. ft. at 9 volts was applied outside the case and 60 amps. per sq. ft. at 6 volts inside.

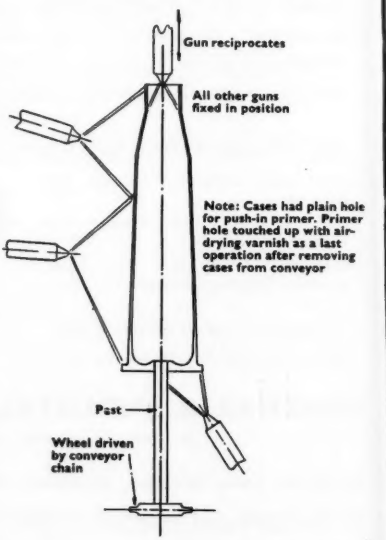
A point of interest to equipment suppliers in this country is the fact that it was stated that deliveries of such a plant could normally be obtained in about twenty weeks from date of order.

At the Frankford Arsenal Plant 57 mm. and 75 mm. steel cases were being made. These were being finished by varnishing in an automatic set-up. They were first subjected to a final cleaning process consisting of an alkali clean, in a mixture of 5 oz. per gal. caustic soda in hot water at 200° F. The cases were two minutes in this solution and then went through a hot water rinse before being for 1½ minutes in a phosphate de-oxidiser No. 171, which was followed by a hot water rinse.

The final operation of varnishing was carried out in a booth by automatic spray guns. The cases were supported on vertical spindles, each spindle being integral with a toothed wheel carried on a conveyor, the movement of which rotated the toothed wheel and spindle. The spray guns sprayed internally and externally so that, except for the primer hole by which the case was supported on the spindle, the entire case was varnished. The conveyor then carried the cases into a baking oven, the temperature of which ensured final stress relieving as well as the baking of the phenolic varnish. On leaving the baking oven the cases were conveyed through a cooling unit. They were then removed from the supporting spindle and the primer hole was touched up with air-drying varnish.

The whole equipment for spraying varnish, oven drying and cooling, took

Fig. 3. Set-up and positioning of automatic sprayguns for coating shell cases on a conveyor


Gun reciprocates
All other guns fixed in position
Note: Cases had plain hole for push-in primer. Primer hole touched up with air-drying varnish as a last operation after removing cases from conveyor
Past
Wheel driven by conveyor chain

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up an area in the plan of about 30 ft. × 20 ft. The spray booth was made by Paasche Air Brush Co. of Chicago, Illinois, the layout being approximately as shown in Figure 2. The varnish used was Varnish V-92 supplied by Sherwin Williams, Philadelphia. Should the varnish be found to be defective, cases are stripped and re-varnished. A very efficient stripper had been developed, this being M.3 Stripper made by Oakite Products Inc. of New York. The time of immersion varied from 1½ minutes to 2 minutes for complete removal of the varnish.

NEW VELOCITY OPERATED SWITCH

THE accompanying photograph shows a new type of velocity-operated, magnetically-coupled air/gas flow switch which has recently been introduced for the control of air and gas flows in pipes and ducts.

Basically this is an on/off device in which a vane is held over by gas velocity against the force of gravity, suitable for use in ambient temperatures up to 350° C. The upper part of the vane arm carries a strong permanent magnet which acts upon another similar magnet in the switch compartment on the other side of a cast-in partition, thus ensuring that the whole of the electrical system is outside of the vane chamber and quite independent of the ducting and its contents.

Three interchangeable air vanes are supplied as standard, the appropriate vane being fitted in accordance with the table given here for the particular velocity involved.

Vane	*Air velocity in ft./min.*
A — 2¼ in.	2,000 and above
B — 4½ in.	1,000 to 2,000
C — 6¼ in.	500 to 1,000

The first figure in the right-hand column above is the average value at which the vane is deflected on increasing air velocity. Below 500 ft./min. a locally fabricated vane should be used.

The ball-bearing supports of the vane lever are of adequate strength to permit of a locally made vane of irregular or rugged dimensions to suit peculiar conditions or odd section ductings. An adjustable counterweight is provided to enable a very fine setting to be obtained.

When the switch is installed in the air or gas stream, at a point near the consuming apparatus, it will operate on any failure of the flow caused by a fault developing anywhere in the system from the inlet right through to the discharge point.

The switch is rated at 5 amps. at 240 v. of 2 amps. at 440 v., with a maximum switching frequency of thirty operations per min. at full load; the D.C. rating is, of course, rather lower. The cradle in which the mercury switch is carried is made reversible so as to enable the switch to be used for either making or breaking a circuit when the flow fails. The device is marketed by Delta Technical and Commercial Services Ltd., Elektron Works, Sydenham Road, London, S.E.26.

Big Paint Job on Floating Dock.—One of the most difficult jobs of painting ever done in S. Africa is now being carried out in the graving dock, where the 40,000 sq. ft. hull of the floating dock is being painted with bitulac enamel. The painters are working under coal-mine conditions, with only a 4 ft. 6 in. headroom under the hull, and with the paint having to be heated to 300 degrees.

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Sensitive Corrosion Measurements with an Interferometer

AN interferometer procedure is being used at the American National Bureau of Standards for studies of the corrosion resistance of such materials as optical glass, porcelain enamel, quartz and other natural and artificial silicates, and various metals. The method is believed to have value for comparing and predicting the chemical durability of various materials. Although interferometers have been widely used in science and industry for such problems as checking the accuracy of block gauges, measuring expansion, and checking optical "flats," they have apparently been used very little in previous studies of corrosion resistance. With the highly sensitive interferometer method, corrosion to a depth of as little as 1 or 2 ten-millionths of an inch can be detected on optically flat specimens.

In the N.B.S. technique, devised by Robert G. Pike and Donald Hubbard of the Bureau's mineral products laboratories, specimens are ground and polished to optical flatness and then immersed to half their depth in the desired corrosive solution. After the desired length of time they are withdrawn, rinsed and dried, and covered with an optically flat piece of quartz. Using a conventional interferometric viewing apparatus of the Pulfrich type, and with an unfiltered helium lamp for illumination, the displacement of the optical interference fringes at the level-of-solution line of the specimen is observed.

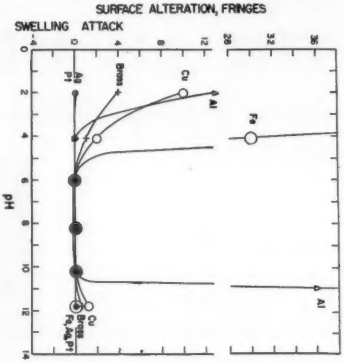
As seen by the observer looking into the eyepiece of the instrument, these interference fringes are vertical parallel lines. If the uniform flatness of the specimen under study has not been impaired by the corrosive solution, these fringes are straight and continuous. However, if the previously-immersed part of the specimen surface has been sensibly attacked, each of the vertical fringes is shifted laterally at the point where it crosses the change-of-thickness line. If, as sometimes happens, the solution has caused swelling of the specimen, the lateral shift is in the opposite direction. A lateral shift equal to the space between two adjacent fringes corresponds to a dimensional change in the specimen amounting to one-half wavelength of light, or roughly 0·3 micron. (A micron is a millionth of a meter or about 40 millionths of an inch.) With careful use of the interferometer, changes in specimen thickness of as little as 0·003 micron can be detected.

Using an interferometer to measure the amount by which a corrosive solution has eaten away the surface of an optically flat specimen. This highly sensitive method of studying chemical durability permits detection of corrosion to a depth of as little as 1 or 2 ten-millionths of an inch

Silicates studied by this procedure at N.B.S. were quartz, fused silica, opal, obsidian, flint, and pitchstone. Porcelain enamels studied were acid-resistant, class A; "glass-lined" tank; and acid-resistant, class D. Metals were cold-rolled steel, aluminium, copper, brass, silver and platinum. The corrosive agents ranged from concentrated sulphuric acid (H_2SO_4) to

5 per cent. sodium hydroxide (NaOH) solution. Exposure times were as short as 1 min. and as long as several weeks. Temperature in most cases was held at 80° C.

A number of interesting and sometimes unexpected results were obtained. Swelling of the immersed surface, rather than attack, was found in several cases. For instance, crystalline quartz showed definite swelling after two weeks at 80° C. in an acid solution (*p*H 4-1). Opal—like quartz, a form of silica (SiO_2)—showed swelling of nearly one fringe of light at *p*H 2, and continued at a similar level to about *p*H 8; between *p*H 8 and *p*H 11, however, the swelling changed rapidly to an attack of 3½ fringes. Although brass was attacked by strongly acid and strongly alkaline solutions, there was a slight indication of swelling in the more nearly neutral solutions. Such apparent swelling could perhaps be caused by the formation of a layer of insoluble salt having greater volume than the metal from which it was formed. Of the metals studied, only platinum showed no detectable dimensional change under the laboratory conditions. The three types of porcelain enamels studied varied widely in their chemical inertness as indicated by the test.

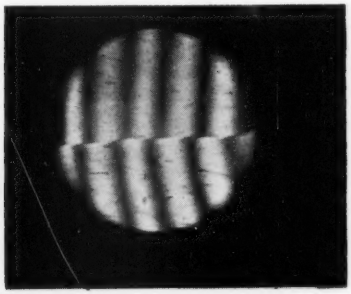


Results of measurements of the chemical durability of certain metals by the interferometric method. Data are for 6 hours' immersion at 80° C. in solutions of acidity or alkalinity. (Because of the rapid reaction of certain samples, immersons much shorter than 6 hours were sometimes necessary; such data have been extrapolated to the 6-hour basis.) Glass, porcelain enamel, and various silicates were similarly investigated

NOTE: *For further details, see "An Interferometer Procedure Applied to the Study of the Chemical Durability of Silicates, Enamels and Metals," by Robert G. Pike and Donald Hubbard, J. Research N.B.S. 50, 87 (Feb., 1953), N.B.S. Research Paper 2394. See also "Studies of the Chemical Durability of Glass by an Interferometer Method," by Donald Hubbard and Edgar H. Hamilton, J. Research N.B.S 27, 143 (1941), N.B.S. Research Paper 1409.*

Withdrawing an optically-flat specimen of glass from a beaker of corrosive solution in which the specimen has been immersed to half its depth. At the left are a number of other specimens whose chemical durability was studied by the sensitive interferometer method. Materials include silver, platinum, brass, porcelain enamel, and various natural and artificial silicates

Photo of a typical fringe pattern as seen through the eyepiece of the interferometer. Swelling of the lower half of the specimen—the half that was previously immersed in a corrosive solution—has caused displacement of the fringes (dark vertical bands) to the left. Here the shift amounts to about ½ fringe. (A shift of one fringe indicates a dimensional change in the specimen of about 12 millionths of an inch.

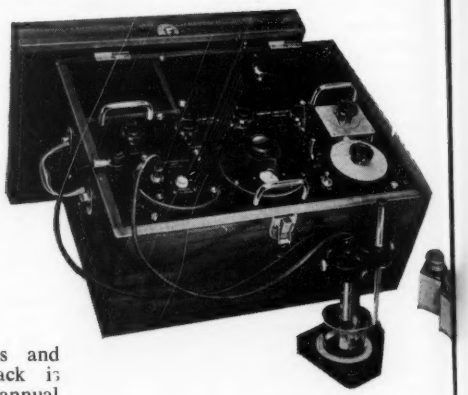


THE *p*H METER

and its use in Corrosion Studies

by

J. E. THOMAS, B.Sc.*



THE destruction of metals and alloys by chemical attack is known as *corrosion*. The annual economic loss to the world due to this cause runs into hundreds of millions of pounds so that the study of the causes of corrosion has become a matter of considerable importance. The selection of materials of construction, and of protective coatings for structures and containers of all kinds, is dependent on this knowledge.

The extent and rate of attack is dependent on the nature of the environment and on the nature of the metal or alloy. In most cases, attack on metals by moist air, water or aqueous solutions, is attributable to electro-chemical action.

There are several approaches to the problem of corrosion prevention or mitigation:—

(1) The selection of metals or alloys less liable to attack in certain environments.

(2) The adjustment of environments so that materials satisfactory in other ways are less liable to attack.

(3) Development of suitable protective coatings.

(4) Cathodic protection.

If two plates of different metals A and B are immersed in a salt solution and joined through a resistance R and a meter M, a current will usually flow between them (see Fig. 1). The positive plate is called the cathode and the other plate the anode. (*In a current-generating cell the cathode is positive but in an electrolytic cell worked by current from an external battery, the cathode is connected to the negative pole of the battery and the anode to the positive.*

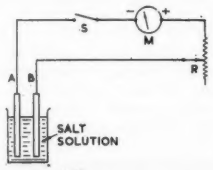


Fig. 1

It is usually found that the anode corrodes more rapidly and the cathode less rapidly when the plates are connected externally, than when the plates are disconnected by breaking the circuit at switch S. If oxygen gas is bubbled over the cathode, the current usually increases, whereas if it is bubbled over the anode the current diminishes and sometimes the polarity may be reversed.

If the cathode is of steel and the

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anode zinc (Fig. 2) it may be possible to stop the steel corroding altogether.

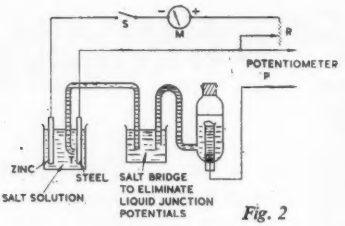

Fig. 2

If a tubulus T connecting a saturated calomel electrode through a salt bridge is inserted, the potential of the steel with respect to the saturated calomel reference electrode may be measured on the potentiometer P. By reducing the resistance R the current can be increased until the potential of the steel reaches a certain value, at which attack on it will cease. The exact potential at which this protection will be obtained depends on the salt solution and other conditions.

If the effect is now considered of an imperfect protective coating on a metal sheet (Fig. 3), it is possible to distinguish between three cases.

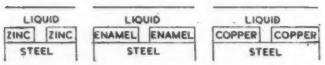

Fig. 3

Case (*a*). A plate of steel covered with a thin coating of zinc with the exception of a small hole and immersed in a salt solution. Zinc is normally anodic to steel so current will flow between the metals, and the steel will be attacked less than if the coating was a non-conducting material like vitreous enamel. If the potential of the steel can be depressed below the protective value it will escape attack entirely.

Case (*b*). Vitreous enamel offers only physical protection apart from the exposed perforation.

Case (*c*). A copper coating is normally cathodic to steel. The steel exposed at the discontinuity, being the anode, will be attacked and in *some* circumstances this will be more intense than in case (*b*).

Zinc, aluminium and cadmium are generally anodic to steel, but can become cathodic under certain conditions. The protective oxide skin on aluminium reduces its anodic effect but, over long periods, aluminium does give sacrificial protection to steel.

Silver, copper, brass, nickel-chromium, tin-nickel alloys are all used as electro-deposited coatings on steel but the degree of protection afforded by them is dependent on keeping the porosity of the coating as low as possible.

In practice, many cases occur of corrosion cells being set up due to a certain area of a structure becoming anodic to other areas. Areas may become anodic due to strain, or due to the existence of a lower concentration of oxygen, breakage of a protective film or else incorporation of impurities anodic to metal.

The measurement of the potential at the surface of a corroding metal gives much useful information about the corrosion process (Fig. 4).

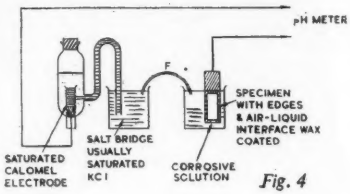

Fig. 4

The e.m.f. of the cell:—

corroding metal	corrosive solution	salt bridge	reference electrode

is usually made with a high-impedance valve potentiometer or *p*H meter to avoid polarisation. The Marconi *p*H meters type TF 511D and type TF 717A may be used on their millivoltage settings giving ranges of ±1·42 volts in conjunction with a terminal adaptor TM 3226A and a reference electrode: saturated calomel electrode type TM 3887A or TM 3887B/3. The edges of the specimen, the air-solution inter-face and the back are best protected from the solution by wax or lacquer; an alternative method is to use horizontal metal sheets cemented

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to glass cylinders (Fig. 5).[1] The junction F may be a strip of filter paper or a capillary tube

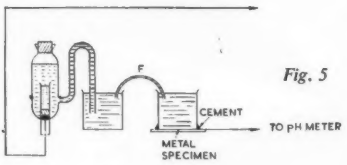


Fig. 5

A useful list of potentials of metals immersed in 3 per cent. sodium chloride solution at 20° C. measured against a saturated calomel reference electrode is given in the table.

The variations of the potential of a corroding metal gives additional information on what is happening in a given set of circumstances. If a metal is covered with a completely non-porous film of oxide it should give the same potential as a block of massive oxide, whereas metal covered with a very porous oxide will show a potential nearly the same as that of the bare metal. The less porous the oxide film the higher will be the potential of the film-covered metal.[2] This is the basis of a simple method of finding out whether, when a metal is introduced into a liquid, the weak points in the film begin to "repair" themselves or to continue to "break down."

If time-potential curves of metals immersed in test liquids are plotted it can be ascertained whether continuing corrosion will occur or whether protective films will build up. Steadily falling values are noted when the liquid is corrosive, steadily maintained or rising values when protective films have formed. An intermediate case sometimes occurs where sudden falls in potential are followed by slow rises, suggesting that passivity and corrosion are delicately balanced—sudden breakdown is followed by gradual repair of the film. An example of this type is iron pretreated in potassium chromate and tested in potassium sulphate solution. Stainless steels sometimes show this kind of behaviour.[3]

The absolute value of the potential is usually not of great significance but *in special cases* it may give an idea of corrosion-velocity, for example, slowly dissolving steels give more noble potentials (i.e., tending towards the positive) than quickly dissolving steels.

The effect of presence or absence of air or oxygen can be investigated by means of time-potential curves. These have also been used to compare the protective action of different pigments on iron. Thus it has been shown that red lead makes iron passive whereas iron-oxide pigments afford only a mechanical protection.

It is sometimes advisable to carry out the tests in a nitrogen atmosphere

Metal or Alloy	*Volts*
Magnesium and its alloys	− 1·60
Zinc, its alloys and zinc platings on steel	− 1·05 to − 1·10
Cadmium plating on steel	− 0·80
Aluminium and its alloys except duralumin	− 0·75 to − 0·80
Duralumin-type alloys	− 0·60
Irons and Steels:	
Non-stainless	− 0·70
Stainless 12 per cent. Cr.	− 0·45
High Chromium	− 0·35
Austenitic	− 0·20
Lead and its alloys	− 0·50 to 0·55
Tin and its alloys	− 0·45 to 0·50
Chromium plating	− 0·45 to 0·50
Copper and its alloys	− 0·20 to 0·30
Nickel and its alloys	− 0·15 to 0·20
Silver and silver plating on copper	0
Rhodium plating on silver-plated copper	+ 0·05
Platinum and gold	+ 0·15

to eliminate the effect of oxygen.

If a metallic specimen has an external layer of oxide, phosphate, nitride, etc., and is placed in an acid attacking the layer, the potential will change sharply when the layer has been completely destroyed. This has been used to find the thickness of the carburised surface layer in case-hardened iron. The method can obviously be extended to a number of other similar cases.

Some investigators have studied the distribution of corrosion potentials over the surface of such large structures as steel ship hulls immersed in sea water. In cases such as this it is necessary to have a standard reference electrode immersed in the sea at a distance from the hull and also a number of search electrodes which can be moved about close to the hull which will respond to the local variations of potential encountered. In a Canadian investigation of this type[4] silver/silver chloride reference electrodes mounted on glass wool pads were used as search electrodes.

Some laboratory investigations of potential distributions on the surface of metal sheets have made use of saturated calomel reference electrodes provided with fine tubuli which could be moved over the surface in all directions (Fig. 6).[5]

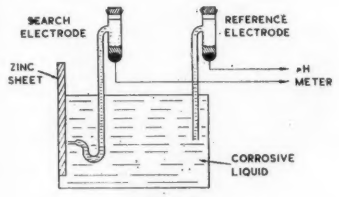


Fig. 6

The above general outlines are sufficient to indicate the value of the *p*H meter as a tool in corrosion investigations. The following references deal in greater detail with some of the methods described.

REFERENCES

1. L. C. Bannister and U. R. Evans, *J. Chem. Soc.* 1930, p. 1363.
2. U. R. Evans "*Metallic Corrosion, Passivity and Protection,*" 1946, pp. xxxiii, xxxiv.
3. R. Morgan, P. D. Dalsimer and N. Smith, *J. Franklin Inst.* 1935, 219, 157.
4. Barnard, *Canadian J. Res.*, 1948, **26**, p. 374.
5. U. R. Evans "*Metallic Corrosion, Passivity and Protection*" 1946, p. 416.

REDUCED PRICES FOR ALUMINIUM

THE British Aluminium Co. Ltd. announces that, simultaneously with the reduction in the price of virgin aluminium ingot to £150 a ton, the following reductions are being made in the prices for rolled and extruded products.

Pure aluminium and medium-strength alloys in all rolled forms, 1d. a lb. All extruded products, 1d. a lb. Heat treatable strong alloys in all rolled forms, ½d. a lb. Paste ½d. a lb.

Virgin aluminium rolling slabs and wire bars are reduced by £9 a ton. Prices for virgin aluminium alloy ingots, hardeners, and granulated powder have also been reduced. Details are available on application.

The new prices apply to all despatches on and after 1st July, 1953.

NICKEL AND NICKEL ALLOYS

SIMPLE tests to identify some nickel alloys and other metals, devised primarily for use in the shop or scrap yard, are described in the April *Nickel Bulletin*.

Items of interest in the Abstract section include a reference to an index of specifications which correlates schedules issued by U.S. Governmental and other standardising bodies.

The procedure used by the Aluminium Co. of America for nickel plating aluminium-base materials is also described, with special reference to zincate pretreatment.

Abstracts relating to high temperature materials include a study of the behaviour of refractory oxides in contact with metals at high temperatures. The results of research on the resistance of cast iron-chromium-nickel alloys to corrosion by oxidising and reducing flue gases are also abstracted.

Abstracts relating to austenitic steels include a report on the occurrence of stress-corrosion cracking, and data on the effect of cold working on the magnetic properties of high-alloy chromium-nickel steels.

CONTROL OF DRY ROT AND WOODWORM

ADDITIONAL laboratory space is being provided by Celcure and Chemical Co. Ltd., of Bearsden Road, Glasgow, to allow an expansion of their work on prevention and control of woodworm, dry rot and marine borers. Developed in the post-war years this company has undertaken a fully-controlled programme of research using initial laboratories; growth of this work and the need for further research has justified the present step. A year ago the company developed a repair service concentrating on control of dry rot and woodworm in existing premises. In addition to Glasgow, facilities have been located at various other Scottish centres.

Among the products developed to meet this field are Mycomfort, a new fungicide which kills the spores and fruiting bodies of timber-destroying fungi like dry rot; Anticelbor has been developed to kill off timber-attacking insects by destroying the larvæ and grubs, without harm to the timber or to humans coming into contact with the material. Celpruf is a timber preservative which has been developed to preserve timber which cannot easily be pressure-impregnated; it is applied by brush coating or steeping, can be painted over when dry, and is harmless to livestock.

FLUORESCENT PLASTIC PRICE TICKETS

ORANGE fluorescent plastic price tickets have been adopted by Archibald Morris, fishmongers of 62 Main Street, Largs, with outstanding success. This is believed to be the first application of such tickets in this field and is the result of personal interest by Mr. J. Neilson of Morriss's.

Problem involved here was that the normal plastic price ticket in white suffered from excessive scrubbing. Lettering on the older tickets had to be repainted annually at a cost, here, in the region of £3. Additional defect was that the white plastic had little "impact" against white fish.

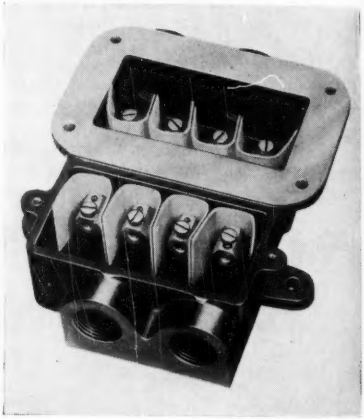
Seeking an alternative Mr. Neilson commissioned the making of price tickets in clear plastic, treated with a fluorescent finish in orange. The lettering is cut on the reverse side and is untreated. Result is a most impressive ticket which positively "glows" when placed on fish. Result is evident in the very large number of passers-by who stop—although Mr. Neilson is cautious in adding that so far this added impact has not visibly boosted sales.

Advantage of the new tickets lies in the fact that they will not need annual repainting and are virtually everlasting. He plans to make a price bulletin board on similar lines in which prices could be inserted into prepared slots.

FLAMEPROOF BARRIER BOX

THE GENERAL ELECTRIC CO. LTD., has designed a flameproof barrier box for connecting conduit entering an inflammable atmosphere from a non-inflammable atmosphere or vice versa.

Fitted with four 20/25 amp. terminals it is suitable for use in circuits up to 660 volts and has two 1 in. E.T. outlets on both incoming and outgoing sides. It has been approved by the Ministry of Fuel and Power for use in gases of Groups II and III and has been awarded Buxton Certificate FLP 3027 (Nov., 1952). Price of the barrier box is £2 18s. 4d.



PROGRESS OF TIN RESEARCH

THE annual report of the Tin Research Institute for 1952 states that the various groups of tin producers who provide the funds have unanimously agreed to increase their contributions by 50 per cent. in order to strengthen the Institute's staff and especially to increase its free technical services to industry in

the chief tin consuming countries of the world.

The tin producing countries supporting the Institute are the Belgian Congo, Bolivia, Indo-China, Indonesia, Malaya and Nigeria. Following this additional grant, information centres were opened in Canada, France, Italy and Sweden; centres already existed in Belgium, Holland and the United States; the Institute's headquarters and laboratories have been at Greenford, Middlesex, England, since 1938.

Mention is made in the report of a number of applications of tin which originated from research at the Institute. The decorative tin-nickel electroplate has had difficulties during its first two years, but a suitable filtering medium has now been found. Tin-zinc electroplate, a corrosion-resistant coating, has found many further uses in the radio, motor-car and aircraft industries.

There is work going forward on improved aluminium-tin bearing alloys; their extra hardness as compared with tin-base babbitt alloys will, it is expected, enable these alloys to recapture for tin some of the market now held by copper-lead and other high-duty bearings.

Research on tin-plate has been concerned largely with the quality of the tin coating on both the hot-dipped and electrolytic types. A satisfactory economical method of producing electrolytic tin-plate in the laboratory has been installed and this permits close study of each of the various stages of manufacture.

This report is issued by the Tin Research Institute, Fraser Road, Greenford, Middlesex, England, and is also available free of charge from all the Institute's overseas offices.

H.F. BAR STOCK HARDENING MACHINE

THE latest addition to the range of high frequency induction heating machines manufactured by the General Electric Co. Ltd. is a bar stock hardening machine for the surface hardening of steel bars. It is designed for use with hardenable steels rather than with carburised bars, and can be adjusted to deal with sizes from ½ in. dia. to 1¼ in. diameter.

Operation is continuous, the bars being placed one at a time against the top of an inclined V-slide and allowed to pass down the slide and through the heating coil. The speed with which the bars pass through the heating coil is governed by two driven V-rollers, one situated above and one below the heating coil. Both rollers are geared together and driven by the same prime mover.

The heating coil puts all the available power into a very short axial length of skin, causing it to heat rapidly to hardening temperature. The thickness of the hardened case depends upon the speed with which the bars are caused to travel through the heating coil, but may conveniently be between ·020 in. and ·10 in. Great care has been taken to ensure a symmetrical case and uniform speed of drive.

Immediately below the heating coil is the angular quench box through which the heated zone passes when it leaves the heating coil. As each treated bar is finished it slides down a chute and is collected in a basket at the bottom. The machine, which is rated at 25 kW output, when treating 1 in. dia. bars at 30 in. per minute gives a hardened case 0·025 in. thick.

INFRA-RED DRYING OF LOUDSPEAKER CONES

A METROVICK infra-red element plant installed at the works of Acoustic Products Ltd., is used for extracting moisture from resin pulp coatings in the manufacture of loudspeaker cones.

Wire mesh spinnings corresponding to the size and shape of the finished cones are passed through a water solution in which is suspended resin-impregnated wood pulp. The process ensures automatic deposition of the requisite thickness of suspended material on the spinning, and automatic removal of much of the water. The infra-red oven through which the cones are passed, completes the drying, leaving a now rigid cone to be taken from the spinning. The plant which is 12 ft. long with a total loading of 30 kW., is fitted with eight standard Metrovick infra-red element projectors. A heat control unit is incorporated and with variable speed conveyor enables various drying times to be obtained, according to the type of cone to be processed.

The type of element used is especially suitable for processes involving moisture extraction because its energy emission at normal operating temperature has a peak at 28,000 Angstrom units, which very nearly coincides with the peak selective absorption wavelength for water of 30,000 Angstrom units.

STAINING OF BRIGHT PLATED SURFACES

THE popularity of bright plating baths has been developed on an increasing scale during the past decade, both here and abroad. The main advantages of bright plating are, firstly, the surfaces are finer grained, less porous and more resistant to corrosion than dull plated. Secondly, the bright plating is usually harder and more abrasion resistant and, therefore, can be used at less weight per unit of area. Thirdly, the necessity for buffing or polishing can be partially or sometimes, wholly eliminated.

Plating conditions are, of course, much more critical for this type of plating and organic brighteners, some patented, some propriety and some traditional are necessary. These include reagents like thiourea, diethylene triamine sodium napthenate sulphonate, sulphides, polysulphides, sodium and ammonium thiosulphates, etc., depending on the metal.

It is obvious that the question of water staining and finger printing becomes a much more serious problem particularly when the polishing process is eliminated.

Water itself is used in vastly greater bulk and weight than any other raw material in electro-plating. As the cost of distilled water for all processes involved would be prohibitive, hard water alone is an important cause of staining of bright surfaces.

Normal softening processes are not a complete answer to this problem. Certain of the latest type base exchange or demineralising would be of benefit, but would still be rather difficult and costly because of the great bulk of water to be treated.

Current practice has been to tumble the bright plated article in sawdust after the final rinse with hot water. The sawdust absorbs the water and with it any trace of electrolite and dispersed hardening agents, which might stain the finish if dried off by evaporation.

Even this simple method has its snags. Sawdust itself is not free from suspicion and sometimes gives rise to staining due to traces of organic materials transferred to the bright plated surface. Moreover, sawdust is awkward to handle and obviously must be changed after a limited number of tumblings.

There is, therefore, a real need for some product which will eliminate the water from the final rinse with its entrained impurities, and also prevent finger print staining or corrosion, oxidation or change of colour due to any other source of attack, either on subsequent handling or in storage.

De-watering oils and similar emulsified products have been of some service in this connection but there are some disadvantages particularly if the article is later to be lacquered.

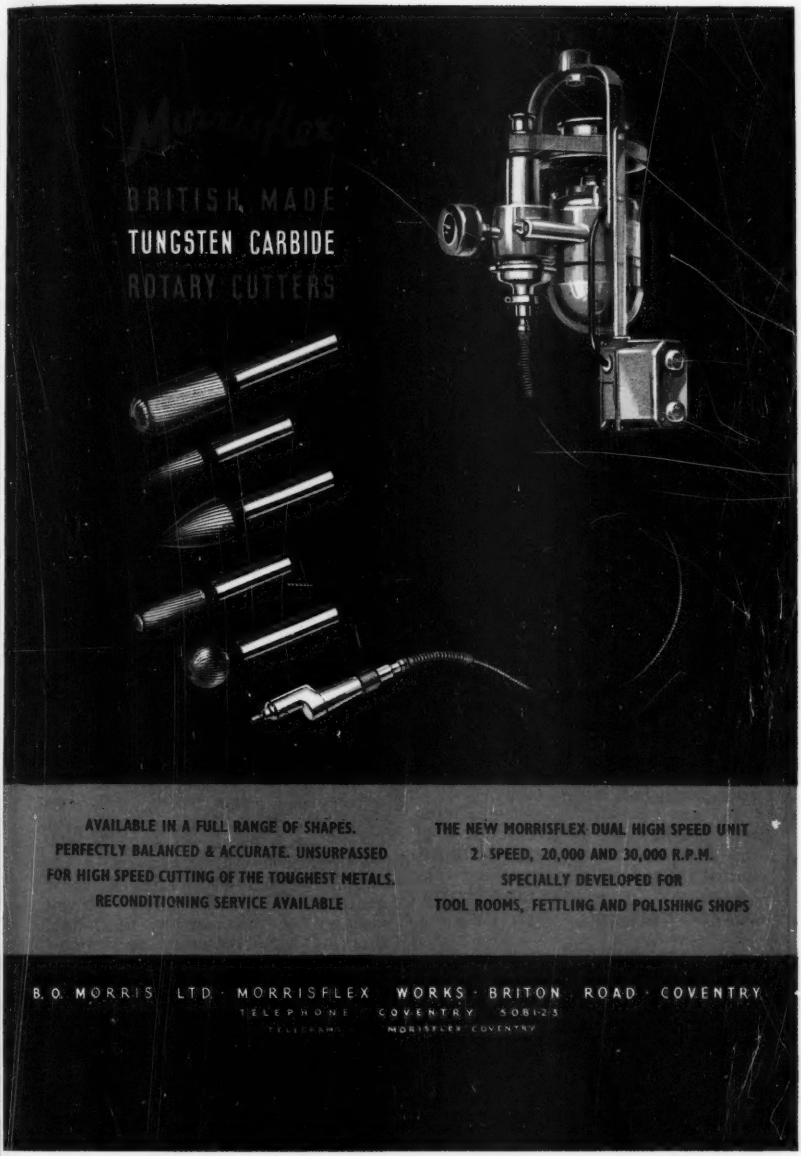
In view of the foregoing, it is likely that considerable interest will be shown in a new product which Ault and Wiborg Ltd., of Standen Road, Southfields, London, S.W.18, have recently put on the market. Known as Paladin Water Dip Clear, this is simple and economical in use; it displaces all water from the final rinse and leaves a microscopic but invisible film which is proof against perspiration, finger printing and discoloration in storage.

Procedure is direct and foolproof. The jigs carrying the bright plated articles are removed from the final rinse bath and plunged directly into the Paladin Clear. Water, electrolite, etc., is completely displaced from all surfaces and crevices, and falls to the bottom of the dipping bath. The jig together with the plated articles can now be removed and the coating dries off in fifteen minutes to an invisible and protective coating.

THE INSTRUMENT HANDBOOK

THE British Industrial Measuring and Control Apparatus Manufacturers' Association at 21 Tothill Street, London, S.W.1, have produced the B.M.C.A.M. Handbook for 1953. In it is outlined the work of the Association and its collaboration with industry, together with a list of the names and addresses of the members of the Association.

Of extreme interest is the extensive list of products listing individual instruments under the names of their suppliers.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SOUTH AFRICAN FINISHING NEWS

(From Our S.A. Correspondent)

S.A.B.S. Specifications for Prepared Paints.—A number of specifications for constituents of paints has now been completed by the paint section of the South African Bureau of Standards, and an announcement by the Bureau says that it is now concentrating on ready-mixed paint products.

Standards for three types of paint have now been completed, these being cold water distemper for interior use, red lead base primer for structural steel, non-reflective olive green camouflage enamel.

Recent S.A.B.S. publications for raw materials for paints cover solvent segregated pilchard oil, raw tung oil, red lead pigment and zinc chrome pigment. Manufacturers whose products comply with the specifications may, on application to the Council of the Bureau, apply the S.A.B.S. standardisation mark to their products.

New South African Products.—A new fade resistant Plasticote green Hygloss roof paint has recently been introduced to the South African market by the General Chemical Corporation Ltd., of Johannesburg and Durban. The need for such a product has long been felt in South Africa owing to the high proportion of ultra-violet radiation which makes green roof paints fade rather badly.

A new Plasticote silicone water repellent has also been introduced by this firm, only one coating being required instead of the usual three. The coat is said to be good for five years of exposure.

World-Wide Survey Includes Durban.—A world-wide survey carried out by the British Iron and Steel Research Association includes Durban, South Africa, which possibly suffers as much from the effects of salt corrosion as any other industrialised centre in the world. Tests of the exposure of ingot iron and zinc over a year show that the rate of corrosion at Congella, the industrial suburb of Durban, is among the highest.

Fuller's Earth Discovery in South Africa.—According to a statement by the Council of Scientific and Industrial Research, pilot plants have been erected for the extraction of attapulgite or fuller's earth, montmorillonite, and a mixture of the two, near Immerpan on the Springbok Flats.

Up to the present time it had not been known that there were deposits of fuller's earth in the Union, but it is expected that the discovery will make South Africa not only independent of overseas supplies but will probably yield enough for export.

New Factory for Dima Paints.—Dima Paints Ltd., have recently occupied their new factory at Alberton, Transvaal. The factory comprises a main double storey building, with other separate buildings set sufficiently apart to guard against fire risks.

The company has considerably extended its range of products over the last few years, which now include industrial paints as its chief line, ready mixed oil paints, nitro-cellulose lacquers, bituminous paints, silk screen paints, aluminium paints, enamels, white lead in oil and flat wall finish.

Berger's Managing Director in South Africa.—An interesting visitor to South Africa during the past month was Mr. W. J. Darby, managing director of Lewis Berger & Sons, Ltd., of Great Britain.

Mr. Darby has pointed out that it should be possible in time to secure adequate supplies of styrene distillates through the medium of the new oil refinery in Durban, and the oil-from-coal plant at Sasolburg, in the Orange Free State.

Currency should be allowed for the import of this outstanding material, badly needed for the surface coating industry of the country, until such time as local materials and manufacturing facilities were available in the Union.

Paint Company's Major Development.—Extensive additions to their factory in Durban have been carried out by Smith and Walters (S.A.) (Pty) Ltd., and sections of the production plant have been transferred to the new wing. Manufacture of paint is now carried out on a gravitation basis.

Cuprogleam is a Bright Copper Plating Solution and a product from the Research Laboratories of R. Cruickshank Ltd.

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DISC TYPE PAINT STRAINER

THE FOREST, disc type strainer shown in diagrammatic form in the accompanying illustration, has recently been put on the market by Donald Leaver Ltd., of 165 Railway Arches, Stamford Brook Station, London, W.6. Although it has been used by at least one of the large paint manufacturers for many years, it is a comparatively new machine as far as the average industrial firm is concerned.

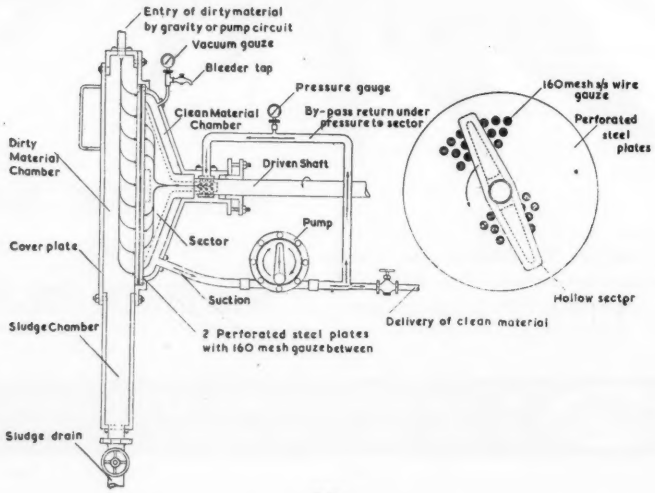
The machine is primarily designed for straining quantities of old paint including the skim; it can, however, be used for straining freshly made paint to remove large lumps or uneven particles. It is used by one or two large motor car plants for straining the paint used in dip tanks.

Made in two sizes, the machine has a capacity of 600 gal. per hour in the 18 in. size with gravity feed from overhead tanks, and 180 gal. per hour in the 10 in. size which is provided with built-in pick-up pump to draw paint from the container.

The machine provides a means of straining mixed paints or enamels through a gauze supported by perforated plates. To prevent clogging of the gauze by the retained particles a return flow contrary to the main filtering flow is introduced via the sector. This sector is mounted on a rotating shaft and sweeps the filtering area of the gauze. Reference to the flow diagram, will explain this circuit clearly.

The pump shown in the circuit is of a positive displacement type driven by a 1 h.p. flameproof geared motor, and assists the passage of the paint or enamel through the gauze by applying a slight negative pressure in the chamber containing the clean material. The delivery side of this pump returns to the sector, as described above, a quantity of filtered material sufficient to clean the gauze irrespective of the flow of the paint or enamel through the outlet valve to a clean material container.

Typical throughput figures are: 570 g.p.h, of air drying synthetic at 85 sec. (No. 4 Ford Cup 80° F.) with 2 lb. head pressure; 450 g.p.h. of decorative enamel at 25 sec. with 1 lb. head pressure; 545 g.p.h. on stoving synthetic car enamel at 60 sec. with 2 lb. pressure; 400 g.p.h. of primer-surfacer at 100 sec. with 3 lb. head pressure.



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Gas Carburising Plant, batch and continuous methods, and rotary units, with precision control. 12 pp. illus. brochure. The Incandescent Heat Co. Ltd., 16 Grosvenor Place, London, S.W.1. (5)

Rust Prevention and Derusting by immersion and brushing-on methods, applicable to fabrications and components. Booklet, working instructions. Basol Ltd., Basol House, 16 Bolton Street, London, W.1. (6)

Fume Disposal of oil and varnish vapours by the scrubbing methods. Illus. article. The Power-Gas Corporation Ltd., Parkfield Works, Stockton-on-Tees. (7)

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Bright Copper Plating, solution details and specification, heating by gas, steam or electricity. Descriptive data sheet—illus. R. Cruickshank Ltd., Camden Street, Birmingham 1. (13)

Denaturiser for overspray paint, prevents adhesion to the reservoir, walls, etc. Printed abstract sheet. The Pyrene Co. Ltd., Metal Finishing Div., Great West Road, Brentford. (14)

Wall protector for spray booths, a maintenance preparation for easy peeling. Printed abstract sheet. The Pyrene Co. Ltd., Metal Finishing Division, Great West Road, Brentford. (15)

Derusting, brush or dip, for iron and steel, or corrosion products from aluminium. Printed abstract sheet. The Pyrene Co. Ltd., Metal Finishing Division, Great West Road, Brentford, (16)

Strippers, for paint and enamel, immersion method, applicable to appliances, motor-cars and machinery. Working instructions. The Orcene Co. Ltd., Victoria Street, Warwick. (17)

Spray Booth Protection, a barrier paste and excess paint remover. Working instruction sheet. The Orcene Co. Ltd., Victoria Street, Warwick. (18)

Spray Washing, emulsion cleaners, mixes, methods and temperatures. Instruction sheet. The Orcene Co. Ltd., Victoria Street, Warwick. (19)

High Vacuum Coating, equipment, applications, technical data. Technical bulletins—illus. W. Edwards and Co. (London) Ltd., Worsley Bridge Road, Lower Sydenham, S.E.26. (20)

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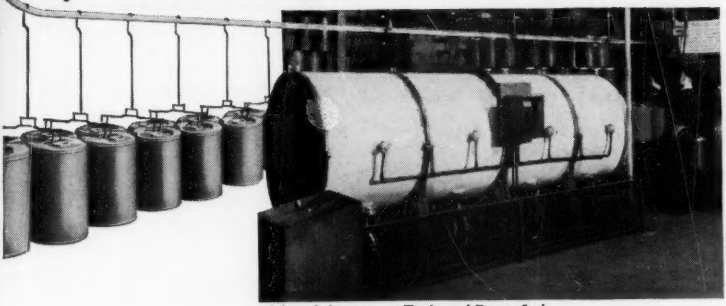

Acknowledgements to Tanks and Drums Ltd.

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Wages, Sales, Stock Records, simplified systems for accuracy, speed and quick reference, based on loose leaf and card index. House magazine. Percy Jones (Twinlock) Ltd., 37 Chancery Lane, London, W.C.2. (2)

Heating Jacket, infra-red, made to order, suitable particularly for laboratory or pilot plant. Folders and illus. price list. The Stabilag Co. Ltd., 1 Broad Street Buildings, Liverpool Street, London, E.C.2. (22)

Spray Guns, various types, and ancillary equipment, materials guide and work chart. Atlas Diesel, Stockholm, Sweden. (23)

Compressor Units, portable and stationary specifications, applications. Four-fold broadsheet—illus. H. E. C. Compressors and Engines Ltd., Lewis Works, Stechford, Birmingham 9. (24)

Electric Radiator, oil-filled, flameproof, suitable for spray booths, paint stores, and similar uses. Data sheet—illus. Dimplex Ltd., Totton, Southampton. (25)

Hydraulic Pump, hand-operated, two stage, maximum pressure 5,000 lbs./sq. in. Data sheet. Chamberlain Industries Ltd., Staffa Works, Leyton, London, E.10. (26)

Metallic Zinc Coating, for iron and steel, brush, dip or spray—stoving. Work schemes and stoving times. Descriptive leaflets. Corrosion Ltd., Southampton. (27)

Solenoid Valve for automatic control of gas flow, through pipes up to 1¼ in. I.D. Applications, capacities. Data sheets—illus. The Rheostatic Co. Ltd., Slough, Bucks. (28)

Flame Failure Devices, three types, employing gas pilot circuit, applications, capacities. Data sheets—illus. Rheostatic Co. Ltd., Slough, Bucks. (29)

Remote Control, for wide variety of industrial applications, flexible cable methods, data. Illus. parts list and brochure. Teleflex Products Ltd. Teleflex Works, Chadwell Heath, Essex. (30)

Industrial Canteens, catering for nutritional values, service efficiency, 18pp. booklet. Intel (Caterers) Ltd., 2 Parkshot, Richmond, Surrey. (31)

Control and Measuring Instruments, temperature, flow, gravity, pressure, etc., scientific, industrial. Illus. data sheets. Sunvic Controls Ltd., Sunvic House, 10 Essex Street, London, W.C.2. (32)

Mobile Mechanical Loader, suitable for carrying, digging, feeding, loading, hydraulic operation. E. Boydell and Co. Ltd., Old Trafford, Manchester 16. (33)

Electrically-operated Tool Units, adaptable, portable, polishing, cutting, abrading, drilling. House magazine. Wolf Electric Tools Ltd., Hanger Lane, London, W.5. (34)

Laboratory Frames and Clamps, unit built, universal application, wall or bench. Illus. leaflets. W. and J. George and Becker Ltd., Nivoc House, Ealing Road, Alperton, Wembley. (35)

Automatic Balance. Aperiodic, nominal capacity 200 grammes, sensitivity 0·1 mg., improved equipment. Illus. leaflets. W. and J. George and Becker Ltd., Nivoc House, Ealing Road, Alperton, Wembley. (36)

Base Resins, for laminates, adhesives, moulding powders: production materials and methods. Data sheets. The British Oxygen Co. Ltd., Chemicals Division, Vigo Lane, Chester-le-Street. (37)

Space Heating, by unit and plenum equipment, gas-fired. Illus, leaflets. Harris Engineering Co. Ltd., York Works, Browning Street, London, S.E.17. (38)

Dust Collector, unit equipment for collection at source. Illus. folder. Harris Engineering Co. Ltd., York Works, Browning Street, London, S.E.17 (39)

Ventilation, Heating, Dust precipitation, various fields of application by unit and plenum methods. 60pp. illus. booklet. Sturtevant Engineering Co. Ltd., Southern House, Cannon Street, London, E.C.4. (40)

Hydrogen Sulphide concentration meter, application to town and other gases. Data sheets. Thermocontrol Inst. Co. Ltd., 2-10 Valentine Place, London, S.E.1. (41)

Air/Humidity control and conditioning; capacity up to 3,000 cu. ft. per unit. Data sheets. Thermocontrol Inst. Co. Ltd., 2-10 Valentine Place, London, S.E.1. (42)

Machining of Alloys, all phases, process methods, tooling equipment. A useful handbook. Henry Wiggin and Co. Ltd., Thames House, Millbank, London, S.W.1. (43)

To ensure maximum benefit from this feature, manufacturers are asked to send a specimen of any new literature they think suitable for inclusion.

To obtain literature appearing on these pages, please refer to easy-to-use reply card facing page 880

Degreasers and Derusters, materials, solutions, work progress instructions. Data sheets and working instructions. Metal Processes Ltd. 5 New Bridge Street, London, E.C.4. (44)

Galvanizing Baths, using gas or oil fuel, with automatic temperature control. Working methods sheet. British Furnaces Ltd., Derby Road, Chesterfield. (45)

Time Recorders, automatic mechanism for column change and two-colour recording. One-hand method. Illustrated folder. Blick Time Recorders Ltd., 96-100 Aldersgate Street, London, E.C.1. (46)

Air Flow Switch, an "on-off" device, operating at a point near to consuming apparatus directly from air or gas velocity. Data sheet. Delta Technical and Commercial Services Ltd., Elektron Works, Sydenham Road, S.E.26. (47)

Heat and Acid Resisting materials, characteristics, properties, unit sizes and applications. Illus. 12pp. brochure. General Refractories Ltd., Ewloe Barn, Buckley, Nr. Chester. Genefax House, Sheffield 10. (Pub. Dept.) (48)

Fireclay Refractories, high alumina, chemical and physical properties, applications. Illus. broadsheet. General Refractories Ltd., Genefax House, Sheffield 10. (49)

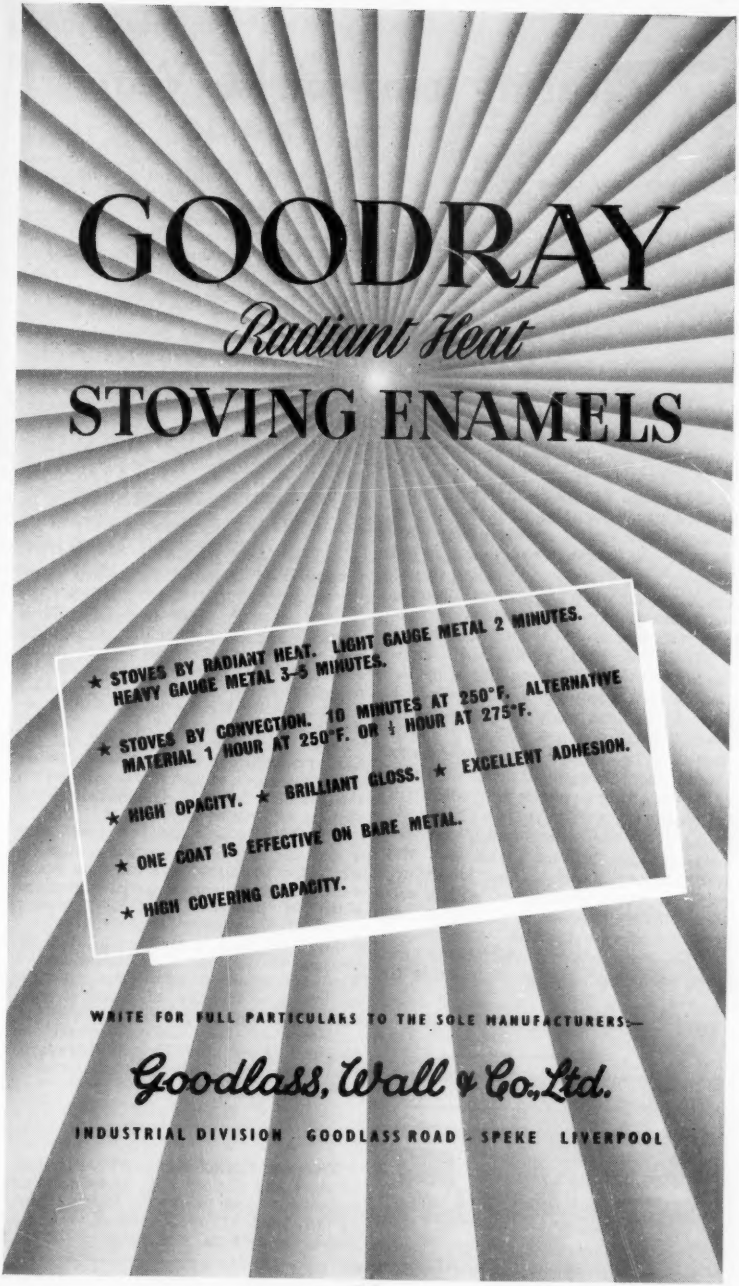
Submersible Pumps, electrically operated, construction details, pumping volume charts. 22pp. catalogue—illus. Sumo Pumps Ltd., Smethwick 40; and 28 St. James's Square, S.W.1. (50)

Chemical and Laboratory Apparatus, for all purposes. Catalogue and up-to-date price list. 121pp. catalogue. Griffin and Tatlock Ltd., Kemble Street, Kingsway, London, W.C.2. (51)

Loader and Transporter, 8-10 cwt., manual or powered operation, for factory or stores. The Western Hire Co. Ltd., 17 Central Chambers, London, W.5. (52)

Spray Gun Selection Guide, comprehensive guide to enable the user to select the right gun and air cap/fluid tip combination. Aerograph Co. Ltd., Lower Sydenham, London, S.E.26. (53)

A.B.C. of Spray Painting Equipment. Booklet, answers to the most common questions asked about sprayguns, tanks, equipment and methods. Aerograph Co. Ltd., Lower Sydenham, London, S.E.26. (54)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Painting the Light Van

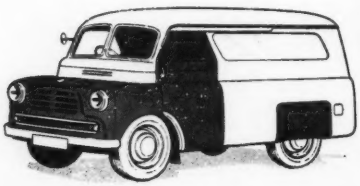
In a recent issue of the Bedford Transport Magazine, *published by Vauxhall Motors Ltd., the following notes on the primer and preparation of the firm's light van were given. In view of their interest to vehicle refinishers, we reproduce them with acknowledgments.*

THE Bedford light van leaves the factory painted with a single coat of black primer, designed to afford temporary protection from rust for a short time pending final finish.

The primer paint used as from chassis No. CA8208 is of three types: shaded areas on the drawing below are painted with a high-bake dip primer; the white areas are sprayed with a new stoving synthetic primer; and touching-up of superficial damage sustained during final assembly is carried out with an air-drying cellulose.

To achieve really good results, careful preparation of the surface is necessary before applying a cellulose-base final finish, and each of the types of primer used requires different treatment. The high-bake dip primer should be thoroughly scuffed with wet 280 grit sanding paper to produce a satisfactory surface. The synthetic primer, on the other hand, requires only a light "nib-off" with dry 400 grit sanding paper. The air-drying cellulose needs washing off with a solvent before subsequent coats of cellulose can be applied.

These preparatory operations are most important if a good finish is to be obtained, particularly when the vehicle has been standing about for long periods in primer. The primer is intended as an initial protection only, and to prevent deterioration and rusting of the metal final painting should be carried out as soon as possible after delivery. The vehicle should not be left standing longer than two or three months, as after this time the primer deteriorates to such an extent that it is no longer effective.



BRITISH STANDARDS YEAR BOOK

THE 1953 edition of the above Year-book has just been published and gives a list of the 2,000 British Standards current at the end of March, 1953, with a brief description of the subject matter of each. A comprehensive index simplifies reference.

The Year-book gives the usual information on the membership of the General Council, the Divisional Councils and the Industry Standards Committees, together with the names of the representatives on the main Special Committees and Advisory Committees.

For the first time the Year-book gives a list of the British Standards under which the Institution's certification trademarks are used, whilst particulars of the work in hand of all the Industry Standards Committees are also given.

The Year-book is essential to all those engaged in industry and commerce if they are to keep up-to-date with the increasing momentum of practical standardisation and simplification.

Copies of the Year-book may be obtained from the British Standards Institution, 24 Victoria Stret, London, S.W.1, price 12s. 6d.

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Licensing Proposals

by AMERICAN FIRMS

FOURTEEN new licensing proposals for the manufacture of American products outside the U.S.A. have been announced by the Mutual Security Agency Mission to the United States. This brings the total number of proposals to 321.

This is the ninth compilation of specific licensing proposals made by American manufacturers and put out under the licensing programme begun by the Marshall Plan organisation and carried on now by MSA.

The licensing programme helps establish contacts between European and American firms interested in entering into licensing or partnership arrangements for their mutual benefit. The firms themselves carry on subsequent negotiations through ordinary business procedures.

American manufacturers are reached by MSA through some 700 Field Councellors, composed of representatives of trade associations, chambers of commerce, banks and the U.S. Department of Commerce.

In the United Kingdom offices of the following are acting as Field Councellors: Associated British Chamber of Commerce, Federation of British Industries, Scottish Council (Development and Industry), and the Ministry of Commerce, Northern Ireland.

The fourteen latest American licensing proposals are as follows:—

Proposal No. — *Details*

308 The A. H. Walter Co. of New York offers patents, processes, techniques and equipment for manufacture of a patented mechanical pencil. Contains a one yard roll of paper in its barrel. Is distributed in U.S. through department stores and mail order firms. Pencil has not been exported. Seeks royalty arrangement.

309 Central Aircraft, Inc., of Yakima, Washington, offers equipment, technical and supervisory personnel for contract aerial application projects in all types of spraying, seeding, dusting, baiting, fertilising and pollenising by aeroplane. Also will invest U.S. dollars and equipment in formation of aerial contracting firms for minority interest in firm. Equipment would be leased or purchased by foreign concern.

310 The Foreign Trade Assistance Corporation, of America, or New York, seeks license for manufacture in U.S. of a novel foreign process for re-dyeing of durable water repelling cotton fabrics. Is manufacturer of sports-wear and outer-wear. Employs 150 persons. Seeks royalty arrangement.

311 Hydrolevel of Ocean Springs, Mississippi, offers equipment, services, patents, processes and techniques for the manufacture of hydrostatic level for use principally in the construction industry. Is a development of the primitive tube level. Is a short range level especially adaptable to building work. Is one-man operated, reduces errors. Simplicity takes extended levelling out of speciality field. Is self-contained, with reel, reservoir and valve control. Is 40 ft., clear tough plastic and extends a level line 75 ft. Is moderately priced. Financial arrangements open.

312 The Ideal Manufacturing Co. of Oskaloosa, Iowa, offers licence for manufacture of milking machines. Firm has produced milking machines and water system for past ten years. Exports milkers to Canada and has licensed two factories, one in France and the other in Belgium, to make milking machines. Has a European Representative who can help with inquiries. Financial arrangements open.

313 The Inland Rubber International Corporation, of Mansfield, Ohio, offers licence to tyre and tube manufacturers in the British Isles, Germany, Italy and France *only*, to manufacture tyres and tubes in moulds supplied by U.S. firms. Products not to be used for domestic distribution in country of manufacture, but to supplement U.S. production in supplying present export market. European manufacturers would

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be paid in local currency. The U.S. firm would sell and distribute the tyres and tubes.

314 The L. M. Eddy Manufacturing Co., Incorporated, of Framingham, Mass., offers licence for manufacture of leather goods items such as military cap visors, belts, holsters, etc., U.S. firm engaged in leather goods production, but does not export. Employs fifty-five. Would participate in financing, depending upon negotiations and share in profits.

315 The Mitchell Manufacturing Co. of New York has been engaged in the manufacture of metal and plastic items and tool making for approximately ten years. Has surplus capacity and working capital which it would like to use in the manufacture of patented items for the U.S. market. Financial arrangements open.

316 Mystic Adhesive Products of Chicago offers equipment, services, patents, processes and techniques for manufacture of pressure sensitive waterproof cloth-tapes, similar paper tapes, industrial adhesives and protective coatings. U.S. production sold through chain stores, department stores, etc. Financial arrangements open.

317 The National Brass Co. of Grand Rapids, Michigan, offers equipment, services, patents, processes and techniques for manufacture of "Dexter" locks in Turkey, France and Italy *only*. Has successful operation in Canada and plants being developed in Mexico. U.S. plant employs 450. Locks have been manufactured in U.S. more than thirty years. Will supply samples. Royalty arrangements sought.

318 The Plastone Co. Incorporated, of Chicago, manufacturing automotive and household chemicals desires enlarge production facilities and seeks license to manufacture new and allied chemical products or to purchase exclusive formula. Interested in sanitary chemicals, industrial chemicals such as fireproof compounds, water repellents and rust removers. Also toilet preparations, soaps, cosmetics and beauty preparations, etc. May also be interested in exchange of patents. Financial arrangements open.

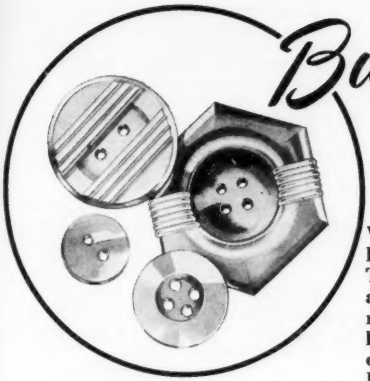
319 The Renee Thornton Cosmetics Incorporated of New York offers capital, equipment, services, patents, processes and techniques for manufacture of its line of cosmetics in France, Italy, Austria, Germany, Turkey and Greece. Has been manufacturing patented, trade-marked cosmetics since 1928. Will ship required chemicals, or oils unavailable locally. Will accept stock in company plus share in profits.

320 Samuel F. Turner, of Phœnix, Arizona, offers consulting service on all phases of ground-water development, use of conservation. Has equipment for surface resistivity, geophysical investigations, electric well logging, gamma ray well logging, temperature well logging and velocity well logging. Also makes ground-water investigations and reports with recommendations. Would accept from private firms part cash and part bonds or interest in company.

321 The Sunstrand International Corp. of Rockford, Illinois, offers services, patents, processes and techniques for manufacture of machine tools, such as lathes, mills and broaching equipment and related products. U.S. firm has been producing this equipment for past twenty-six years. Seeks share in profits or royalty arrangement.

Corrosion Ltd., 16 Gloucester Place, Portman Square, London, W.1, announce the introduction of an improved zinc-rich anti-corrosion primer for iron and steel called "Giopane Stoving." The material is claimed to be an improvement on ordinary types of cold galvanizing compounds and to occupy a place midway between hot-dip galvanizing and cold galvanizing. The cost is no greater than that of normal cold galvanizing materials and the coating is baked on at ordinary paint stoving temperatures.

The London County Council is such a big user of paint (painting costs are estimated at £1,000,000 per year) that they have now set up a paint testing laboratory at County Hall. This laboratory is an extension to their already existing chemical laboratories and includes accelerated weathering apparatus, paint drying chamber, bend, scratch and hardness testers and a special distillation plant to supply metal-free water to the weathering apparatus. We hope to publish a more detailed description of the laboratory in the near future.



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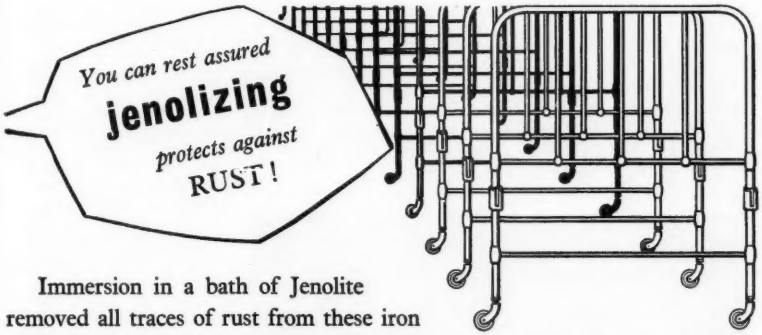

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GLASGOW: Jenolite House, 304 High St., Glasgow, C.4.
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S263/21

NAMES IN THE NEWS

Appointments

Radiant Metal Finishing Co. Ltd., announce that **Mr. J. Coulthard,** who is well-known in the plating industry and was formerly plating chemist with Messrs. Ronson Products Ltd., has joined the Company as Chief Chemist. **Mr. G. P. Collins** the Company's Manager whose experience extends over 30 years has now been appointed to the Board of Directors.

Mr. G. W. Robinson, of 47 Ullswater Avenue, Acklam, Middlesborough, has been appointed to represent Jenolite Ltd., manufacturers of industrial chemical specialities, in the North Eastern area. Mr. Robinson, who lived on Tyneside until 1951, has specialised in light and automobile engineering matters.

Lacrinoid Ltd. have appointed Mr. E. **Emslie** to take charge of sales of their polishing materials and finishing compounds. **Mr. H. H. Goulding** has been appointed buyer, and **Mr. C. W. Tringham** has been made production controller.

Edwin Pryor and Son Ltd. have appointed **Mr. F. H. Colley, Mr. C. Ellis** and **Mr. D. O'B. Minogue** as special directors of the company. **Mr. E. Simmonds** has become the company secretary.

Wild-Barfield Electric Furnaces Ltd. announce that the new address of their Scottish area sales and service engineer, **Mr. D. McDermott,** is 147 Bath Street, Glasgow (telephone: Douglas 8839). Mr. McDermott is also sales and service engineer for the associate company G.W.B. Electric Furnaces Ltd., and the subsidiary, Applied Heat Co. Ltd.

Mr. D. MacPhail has taken over the sales directorship of Indestructible Paint Co. Ltd. He was formerly deputy sales director.

Leyland Paint and Varnish Co. Ltd. have appointed **Mr. J. T. Jones** north-western area manager.

Steele and Cowlishaw Ltd., of Hanley, Staffs, have appointed **Mr. W. F. Fisher** as London manager for advice and sales of all products in the Home counties. Mr. Fisher will operate from the London office at High Holborn.

Mr. Eric G. Sangster, B.L., has succeeded **Mr. John Baxter** as general secretary to the National Paint Federation. Mr. Sangster, a Scot, thirty-one years of age, takes up his official duties on 15th July.

At a small dinner party held last month at Wolverhampton by the directors of Mander Brothers Ltd., in honour of **Sir Geoffrey Mander,** the chairman, who had been with the firm for fifty years. **Mr. Philip Mander,** managing director, presented Sir Geoffrey with a Georgian silver teapot. (See photo on left.)

Tributes were paid by **Mr. Arthur Goodall** and by **Mr. Geoffrey Butler,** the newest member of the board, who said that the methods of trading and the quality of leadership established by Sir Geoffrey were an example to all. He wished that the Mander spirit was commoner in industry. Sir Geoffrey replied with amusing anecdotes of the past.

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Mr. John Rogers, O.B.E., L.L.D., has retired by rotation from chairmanship of I.C.I. His resignation took effect as from 30th June, 1953. Mr. Rogers has been actively associated with the company, and its predecessors, for more than fifty-four years.

Dr. Alexander Fleck, D.Sc., has been elected to the chairmanship in succession to Mr. Rogers, with effect from 1st July, 1953. His association with the company dates back to 1917. Dr. Fleck was elected deputy chairman to the Board of I.C.I in December, 1950.

J. Roy Gordon, vice-president and general manager of Canadian Operations of The International Nickel Co. of Canada, Ltd., has been elected a director of the company, it was announced today by **Dr. John F. Thompson,** chairman of the Board of Directors of Inco. He succeeds the late **R. Leslie Beattie** who had been vice-president of the company since 1942, and a director since 1943.

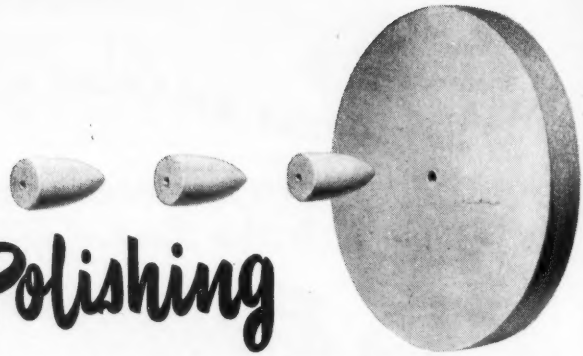
Mr. P. E. Trier, M.A., and **Mr. G. Knott, M.A., A.M.I.E.E.,** have been appointed joint managers of the Mullard Research Laboratories.

A recent visitor to this country is **Mr. F. S. J. Swackhamer,** manager of the Resins and Plastics Department of Shell Chemical Corporation, U.S.A. He is here to discuss Shell "Epon" epoxide resins known in this country as "Epikote" resins. Mr. Swackhamer was promoted to his present position in July, 1951, having formerly been with the American Cyanamid Co.

OBITUARY

We regret to announce the death of **Mr. John Fletcher Miller,** chairman and managing director of Fletcher Miller Ltd. Mr. Miller, who was well known in the northern counties oil trade circles, started business in Ashton-under-Lyne, Lancs, many years ago and many personalities of the industry were present at his funeral.

The "Quarterly News" of W. Canning and Co. takes special note of an important event, the completion by the chairman of the company, Sir Ernest Canning, of sixty years' association with the firm. Mr. G. A. Pope, deputy chairman, speaking at a celebration dinner said, "One of my first recollections of our chairman is that of a round-faced, pink-complexioned young man of about 22, wearing an old straw boater. . . ." The front page illustration of the original drysalters-cum-chemist shop, boldly featuring the present company title, appears indeed a remote beginning to the extensive organisation built up under the chairmanship of Sir Ernest, serving both home and overseas markets.



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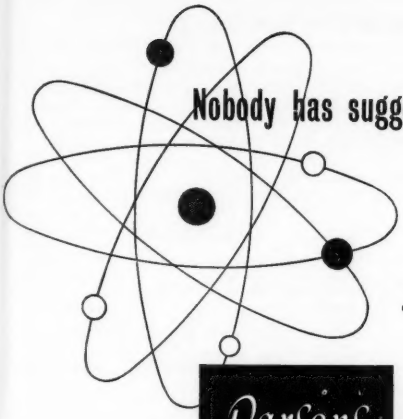

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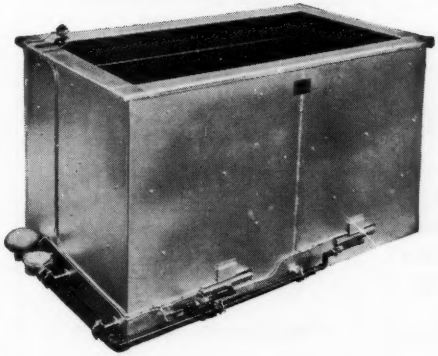

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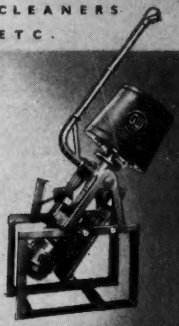

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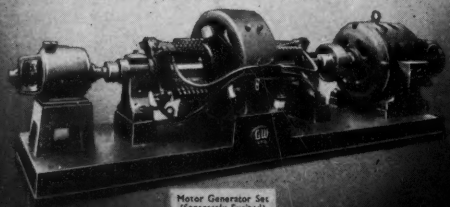

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